THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME XC., No. 26. Whole No. 1,777. | NEW YORK, MONDAY, JUNE 28, 1909. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. H. WADELTON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

NOTICE—

Wrinkle Department, American Gas Institute.. 1157

Our Semi-Centennial Number 1157

EDITORIALS—

Briefly Told 1157

Second Annual Meeting, Canadian Gas Association—Secretary Britton's Call to Arms—Retirement of a Well-Beloved Veteran—Current Mention.

Discussing the Paper by Mr. G. W. Barnes on "The Relation of Company to Consumer"..... 1159

Geology as Applied to the Formations in which Natural Gas is Found in the Appalachian Regions, by Prof. Bownocker..... 1160

Difficult Problems which Public Utility Commissions are Endeavoring to Solve, by Mr. H. C. Abell—Concluded from Page 1122.... 1164

*New Form of Gas Burette, by Mr. A. E. Hill. 1166

Rules for the Government of Employees, Baltimore City Department in Charge of Public Lighting..... 1166

The Koppers' Coke Plant at Gary, Ind..... 1167

The Expansion of Concrete Made with Coke Breeze 1167

The German Association of Gas and Water Works Men..... 1168

A Failing Among Competent Workmen..... 1168

SPECIAL ENGLISH CORRESPONDENCE..... 1169

Annual Meeting, Institution of Gas Engineers—A Slot Meter Question—The International Congress of Applied Chemistry.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 1170

Extension of the Minneapolis Franchise—Gas for East Stroudsburg, Pa.—Dr. Fischer and the Indianapolis Gas Company—Light for the Dead at a Price—Mr. E. A. Barnett is Doing Well—Gas for Stratford, Conn.—Personal—Cheaper Gas for Hartford, Conn.—Proposed Company for Anamosa, Ia.—Capt. Spragle is in the Silk Business—Good for Mr. E. G. Schmidt Proposed Plant for Olney, Ills.—Mr. Little Secures Control at Sault Ste. Marie—Two Persona s— ined for Stealing Gas—Mr. McConnell Goes to Colorado Springs, Col.—And Other Items.

The Market for Gas Securities..... 1172

[NOTICE.]

Wrinkle Department, American Gas Institute.

WRINKLE DEPARTMENT, AMERICAN GAS INSTITUTE,
OFFICE OF EDITOR, GAS OFFICE BUILDING,
DETROIT MICH, March 12th, 1909.

To the Members, American Gas Institute: All members of the American Gas Institute are earnestly requested to forward contributions for the Wrinkle Department as soon as possible.

Your co-operation determines the success of the Department.

F. L. CROSS, Editor.

OUR SEMI-CENTENNIAL NUMBER.

Sufficient progress has been made in getting up our Semi-Centennial Number to enable us to place something definite and precise before our readers as to its magnitude. Repeating our remark of a week ago that it will exceed in value any other special number of a technical paper heretofore published, in its special applicability to the industry directly concerned, we here furnish some reasons why that belief is justified. In the first place the number will go considerably over the 100 pages originally planned, not that advertisers have "flocked in large numbers" to help us out, but that the articles secured have gone considerably beyond the space at first allotted—however, this may be truthfully termed a "good fault." So far (the evening of the 24th) the articles received number 21, and these with their titles, are appended—so far the illustrations number over 250, and the text covers 68 pages, with three articles yet to be received. Here is the list, given as nearly as possible in the order of reception:

"Uncle Jerry in Reminiscent Mood," by Mr. J. B. Howard, Galena, Ills.

"A Rapid Review of the Gas Industry in New York City," by Dr. A. H. Elliot, New York City.

"Some Processes I Have Known," by Mr. F. Egner, Norfolk, Va.

"Public Utilities Commissions," by Mr. R. C. Dawes, Chicago.

"Developments in the Commercial Division of the Gas Industry during the Past Fifty Years," by Mr. Philmer Eves, Indianapolis.

"Meters and Meter Makers," by Mr. Donald McDonald, Albany, N. Y.

"A Half Century's History of the Gas Industry on the Pacific Coast," by Mr. John A. Britton, San Francisco, Cal.

"Fifty Years' Progress in the Gas Industry of Canada," by Mr. W. H. Pearson, Toronto, Ont.

"Fifty Years of Street Lighting in and around New York," by Mr. H. Thurston Owens, New York.

"Gas Association Work in the United States," by Mr. George G. Ramsdell, New York.

"The Gas Coals of America," by Mr. Jas. D. Perkins, New York.

"Progress of the Gas Industry of Great Britain during the Past Fifty Years," by Mr. Norton H. Humphrys, Salisbury, England.

"Four Men Whose Work in Fraternizing the Gas Industry was of Exceeding Value," by Mr. Arthur E. Boardman, Brevard, N. C.

"History of Water Gas," by Mr. F. N. Morton, Philadelphia, Pa.

"Growth and Value of Demonstration Work," by Mrs. Helen Armstrong, Chicago.

"The Development of the Ammonia Industry in Gas Works during the Last Fifty Years," by Mr. R. W. Hilgenstock, Pforzheim, Germany.

"History of Gaseous Fuel as Applied to Heating Retorts," by Mr. F. Bredel, Milwaukee, Wis.

"History of Vertical Retorts," by Mr. Fred. Mayer, New York.

"Heating Machines," by Mr. E. P. Reichhelm, Jersey City, N. J.

"Residuals," by Mr. Carroll Miller, Pittsburgh, Pa.

"Progress in Electric Current Development in the Artificial Lighting Field," by Mr. Albert F. Ganz, M.E., Stevens Inst., Technology, Hoboken, N. J.

Since gold does not require gilding so that the mass may take on added value, more phrasing of ours over these authors and the themes upon which they write would be equally futile. We might, however, and we do reiterate the statement that no single number of any periodical devoted to the chronicles of the gas industry ever equaled this as to value of contents. There are the names of the writers, also the names of their themes. In view of this exceeding literary feast, it hardly seems necessary to urge upon those who wish more than one copy of our Semi-Centennial issue to send in their orders at once. We should here add that three further articles are sure to come to hand next week; but we have listed none the copy for which is not now in the hands of the editors.

BRIEFLY TOLD.

SECOND ANNUAL MEETING, CANADIAN GAS ASSOCIATION.—The men of Canada may well look back with satisfaction upon the results accomplished at their Second Annual Meeting, which was held in the beautiful New Windsor Hotel, Montreal, the 18th and 19th inst., under the vigorous and sequential domination of its President, Mr. J. C. Hay, of Listowel, Ont. To begin with we surely had wintry-spring weather the afternoon of the first day, when sleet and snow came down in volume sufficient to cause slippery streets. However, this

LIBRARY OF CONGRESS, JUN 28 1909, SMITHSONIAN DEPOSIT.

are nothing new in Montreal; in fact, the irrepressible Mr. Carbray, of the Montreal Company, remarked that the weather was simply singing hail to the Chief, for the pellets were ponding just as it was announced that Mr. Norris had been elected to the Presidency. The first day's sessions were called promptly on time by the President, Mr. J. C. Hay, of Listowel, whose opening address was listened to by at least 40 good men and true. It is true that Mr. Hay is not a gas man in the manufacturing and distributing sense of the term; but he is near akin, in that he is an important coal factor in the Dominion. Last year he was chosen President, however, with the distinct understanding that his mission was to, as far as possible, correct certain customs ("oddities," we will say) concerning the weights which should be accepted as the correct ones for duties to the north and west of the border. That he was properly selected was quite well shown in his address, where he detailed the good work that had already been accomplished between the "Home Office" and the importers of coal. The paper list was an excellent one. The initial one read was that by Mr. P. S. Coate, who most interestingly described their "Experiences in Changing an Artificial Gas Plant to a Distributing Plant for Natural Gas." As the author was Manager of the Chatham (Ont.) Gas Company when the changes were being made, he certainly spoke by the book, the chapters of which are well worth reading. Then followed the story of "Gas Arc Installation and Maintenance," as told by Mr. Arthur Hewitt, Asst. General Manager of the Consumers Gas Company, of Toronto. It seemed rather odd to hear that the Consumers' folks had been perhaps less than a year in putting out gas arcs on a large scale; but now that they are in it they are evidently in it to stay. For instance, since January 1 to May 31 the Company had placed something over 1,900 arc lamps of the Humphrey, these being all out on a rental basis. Mr. Hewitt looks a clean cut chap, and 'tis easy to predict that his Company will have 5,000 lamps out before the end of 1910. Mr. John Keillor, of Hamilton, Ont., followed with a terse paper on the "Candle Power of Gas in Canada," and the tenor thereof with the trend of the discussion, as well, pointed to it that heating value, not candle power *per se*, finds increasing numbers of advocates in the Dominion from year to year. The final paper was by our own J. M. H. Young, of London, Ont. His manner has not changed a bit since he "crossed the border," and while we do not wish to take from Canada any of her men (in proof whereof we just mention that they have taken from us a pretty good one in the person of Howard Mann), it was hinted more than once that certain people in the State were inclined to induce him to recross the border. Be that as it may, he certainly is doing excellent work in London. May his shadow never grow less. This ended the programme proper. The officers elected were: *Hon. President*, Mr. J. C. Hay, Listowel; *President*, Mr. J. S. Norris, Montreal; *Vice-President*, Mr. J. H. Pearson, Jr., Toronto; *Secretary and Treasurer*, Mr. A.W. Moore, Woodstock. Referring to the latter, it behooves us to say that he is in every sense a model man about a business desk. On the evening of the first day a beefsteak dinner was served in Dominion Park. Shades of night, how cold it was! Mount Royal sent his 3-second blast-and-run-blows, that were sufficiently strenuous to even cause some of the bronzes in the park to shiver and moan. However, a return to the Windsor settled it all; for there was naught of cold within its walls. Saturday was a bright, glorious, summer day on the St. Lawrence, and the outing for the day was an inspection trip to and through the Montreal works, which visit showed there was plenty of work ahead for Messrs. Norris, Mann and Skinner in the reconstruction thereof. The plans mean that in 1911 Montreal will have a model plant of two units, which for completeness will not be excelled by any other plant in America. Montreal feels the impulse of a growth long retarded, and 'tis queer to write it here that modernity has at last won the day in this beautiful old city. The next meeting place will be Hamilton. The writer wishes here on behalf of the JOURNAL and himself to acknowledge the hearty attention of Messrs. J. S. Norris, Howard Mann and Secretary Moore. We did omit to say that after the works had been inspected the balance of the morning and the early afternoon was most agreeably taken up by a tour of observation, on the street railroad company's lines, while seated in an observation car, that was completeness itself.

SECRETARY BRITTON'S CALL TO ARMS.—No one may truthfully say that Secretary John A. Britton keeps putting off things, whether of great or less import, that will not suffer from over-mentioning. So it is with his first gun in connection with the 17th annual convention of the Pacific Coast Gas Association, which will be held in San Francisco the third week in September—to be precise, the 21st, 22d and 23d days of that month. His initial reminder came to hand last week, and in partial answer to the question, "Is everybody busy? If not, why not?" the Secretary makes the following statements, suggestions and urgings:

"To have a successful convention we must have good, live papers, in order to bring out proper discussions for the enlightenment of all concerned; and we again take this means of endeavoring to awaken the latent talent of our members as a whole, and reminding you all of the coming convention, so that you may become imbued with the fact that our next meeting will be held in San Francisco, that the dates are September 21, 22 and 23, next, and we hope that it will surpass all previous meetings in the way of good, live papers, 'Experiences' and 'Wrinkles;' and last, but not least, good fellowship.

"We also want to swell our ranks this year, so don't fail to call the attention of all your friends and acquaintances, who are eligible to membership, to the good work being done by the Association on the Pacific Coast for the benefit of the cause. A line to the Secretary will bring forth the necessary application blanks.

"Key Note.—Do it now, and the results will show in our annals."

It looks hardly necessary that we should add that Secretary Britton's address is No. 925 Franklin street, San Francisco.

RETIREMENT OF A WELL-BELOVED VETERAN.—This week we received a letter that both pleased and pained us—the first, in that we knew his retirement was purely voluntarily and that he retires in good physical condition to enjoy that measure of rest which belongs to those whose long activity was accompanied by the caution that enables one to rest securely on the fruits of his labor. The second, that we regret his getting out of the active division, in the ranks of which he labored so long, so industriously and so fraternally. And the writer was Mr. John Gimper, whose active connection with the industry dates back to 1869. We know personally that he was the Superintendent of the Leavenworth (Kas.) Gas Light Company in 1872, when that corporation was under the benign domination of the late Dr. Edward Wells. From Leavenworth Mr. Gimper went to Galveston, Tex., in 1880, succeeding in the capacity of Superintendent and Engineer the late, and well-loved, "Fred." Beck. Prominent in the Association work of the Southwest, through his early membership in the Western Gas Association, always equable in temperament, sound in judgment, proficient in his profession and "straight as a tight-drawn string," he goes out from the active ranks with all the acclaim that goes with an active, well-spent business career. Mr. Gimper will make his home in Pasadena, where he may be sure he will be bothered by many a gas man whom business or pleasure will call to the Coast.

CURRENT MENTION.—

THE Gas Bench Construction Company, of St. Louis, will reconstruct 4 benches for the St. Clair County Gas and Electric Company, East St. Louis, Ills.

"V. W.," writing from Boston, under date of the 20th inst., says: "I have failed to notice in the JOURNAL any mention of the action recently taken by the Massachusetts Supreme Court in the instance of the full Bench order sustaining the exceptions of the plaintiffs in the cases of Mary Gillis and of her husband, Jno. Gillis, against the Cambridge Gas Light Company. Mrs. Gillis was injured by falling into a coal hole in front of Weber's restaurant, Temple Place, Boston. From the evidence it appeared that defendant, earlier in the day and within a few hours of the accident, delivered coke at Weber's restaurant, and it was shown the remnants had not been thoroughly cleaned up. The court held it was the duty of the Company's teamster to clear out all particles of coke or other matter from the rim of the coal hole after using it, and to properly replace the cover upon the coal hole before leaving the premises, and that the jury might properly have found that this was not done, and that the negligence of the defendant was the efficient cause of the plaintiff's injuries."

"ON June 14th natural gas and electricity were introduced in Capitol Hill, Okla., by the Oklahoma Gas and Electric Company, of Oklahoma City. The Company established a record for rapid construction that is unequalled in this country. The Company's franchises became effective May 27th, and 18 days thereafter both the gas and electric light service were in use. A celebration took place the 14th, in which the entire population took part. Mayor Donnelly made an address highly flattering to the Company, and then touched off the flame with a Roman candle. The display was visible for miles in every direction, and several thousands of people were gathered about the square in which the celebration was held.—R."

Discussing the Paper by Mr. Geo. W. Barnes on "The Relation of Company to Consumer," Read at the last Meeting of the Natural Gas Association of America.[1]

The President—This is a very valuable paper, and I hope there will be a full discussion on many of the points brought out.

Mr. Garard—This is certainly a very good paper. It has always been our hope and aim to instill into our office employees the fact that that is "our house," and everyone of our customers who visits it is our guest, and to learn to treat them as such. We try to teach our clerks that the company pays them to be abused; that that is some of the things they are there for—by-the-way, I may say they earn their money in a great many cases, [Laughter and applause.] As a gentleman here said, being courteous and trying to smooth things over, is one of the easy ways out of it; but, I am sorry to say, there doesn't seem to be any feeling for a gas company among the city officials, who appear to have it in for a gas company under any and all circumstances; not on the slightest provocation, but without provocation at all. There are some pretty rigid laws in Ohio, but in Pennsylvania, however, the laws are more liberal. There we can fix the price ourselves and saying to the consumer to use gas or let it alone. In Ohio, the other fellow fixes the price. The main thing in connection with the office is to impress it upon the employees of the company to always be courteous. We at all times feel that all of our customers are part of our family and we try to treat them as such. I believe we have as many friends among our customers as the generality of gas companies or people who have to use meters. You cannot expect very many friends if you are backing up a meter.

Judge Douglas, of Mansfield—I do not know that I have anything to say on this subject, because, ordinarily, I have all I can do to keep my feet in the average lawsuit, which is a line in which I do claim to know something about, whereas on the subject before you I am really a novice. I have had some little experience in respect to one or two of the matters suggested in the excellent paper just read. The fact is the gas companies, and every company undertaking to perform a public service—and they perform the great things of this country—are too often met in the most unfriendly attitude by the governing bodies of our municipalities, or by the State legislature, or whoever it is who gives them a right to do business. It is a most unfortunate thing, but let me say to you gentlemen, Mr. Garard, and the author of this paper as well, hit the real milk in the cocoanut when saying the company must see to it that proper and friendly relations exist between it and the consumer. The dissatisfied customer, as stated in that paper, is a very bad walking advertisement. The reason for this is that, as the domestic relation of the family lies at the base of all government, so does your consumer lie at the base of your city council, of board of public service, or legislature, where they make sentiment for or against you; and woe betide the company which has that sentiment universally against it, for then you cannot get fair treatment from your common council nor from your Board of Public Service, or whatever your governing body is, unless harmonious relations exist and public sentiment is in your favor. The world, however, is not as bad as some people think. Unfortunately, we have a certain per cent. of dishonest men and of grafters, but the world is really better than we think it is, for you will always find some men in the council who can be appealed to if they have not been unconsciously affected by the virus of a body of disgruntled consumers. Under our system of government where men must be returned by the vote of the people, although they may pass for good men and be fair-minded in their relations with other fellow citizens, as a rule, nevertheless, they are lead by the body of consumers. If you have a satisfied body of consumers who will not get the virus into your public officials, then you can operate your company under fair conditions. You will always find that a per cent. of men, if the suggestion is put up to them, and I have been before them in different relations, want to tax you to death, and to hedge you about with every possible restriction. That makes the road hard for the consumer also if he would only know it, because it is the good service he finally wants after all. Take it in the traction or steam railroad or in the gas service. You would better have one good, robust, healthy company planted upon a good, firm, foundation, than to have two competing weak companies. It seems hard to make people of sense understand that, but it is better to have one good company under such conditions than to have two weaklings that will give you poor service even at a lower cost. I live in Mansfield, O. We better have one good street railway company making a fair profit, able to meet its bonded charges and everything of that sort, with a punctual, safe and efficient service, than to have two weaklings that would not give us proper service at lower cost. So it is in this business. That is the thought, with the central idea, which lies at the base of the very excellent paper we have just heard. And these difficulties you will largely overcome when you take the course advocated here, namely, to adopt that kind of agency, superintendency or management which molds public sentiment into a demand for efficient service in return for fair treatment. It is easy to do where, like in the case of the companies managed by Messrs. Garard, Bailey and others, the consumers are located in one spot or one locality. But the company in which I have an interest, and with which I have business relations, has diffused patrons extending throughout 50 different towns. I think it is saving at the spigot and losing at the bung when you do not put capable men at the helm in your various towns, men who have breadth of knowledge, executive and administrative force and power, and the respect of the people, men who will be able to put a question of policy or a question of price up to them fairly and squarely. If you hire a $50 man, you will get $50 service. What you want is a man at the head of your company who will be able to educate the people up to the standard of believing there is a mutual relation between the consumer and the man who is furnishing the best, the cheapest and the cleanliest fuel on earth. Among the different elements you have to contend with is the newspaper. You must attend to the newspapers properly, for they put more poison into the minds of the consumer than comes from any other one source. I do not think in this gas business it is a question of willful, deliberate and intentional harm to the company. I think chiefly it is because of the fact that ignorance dominates the consumer in drawing the conclusions and forming his opinions. Why, I was green enough—and I am yet somewhat green on the subject, to take it, face value, the doctrine that they were certainly pumping air into their pipes 5, 6, 8 or 10 years ago. However, almost all your consumers believe that yarn to-day—believe that absolute physical absurdity and impossibility. They gulp it right down. The newspaper as your good agent and friend can do more to dissipate this false prejudice than any other source, and a management that has ability, breadth of knowledge and executive and administrative power, should be able, through its own influence and the influence it is able to exert through the public prints, to get these false notions out of the minds of your consumers. When you have done that you will have gone a long way to satisfy your consumers. The lawyer is a sort of a gas proposition himself. I beg your pardon for taking so much of your time. [Applause.]

The President—I want to add one word to what the speaker has so well said. I think you will agree with me that the standard of a corporation in any community is no higher than that of its representative. [More applause.]

Mr. Jarvis—Back in Kansas City, where I have installed a great many burners, a prejudice with false impression has existed to the effect that air was being pumped into the pipes. The material man, the plumber, the gasfitter, who is disinterested, can do much to remove these false impressions and prejudices, if he is frank and open and undertakes to assist the gas company by explaining and demonstrating the facts as they are. I remember an instance where a lady, who had a bill that ran up pretty high, claimed she was paying for nothing but air. I explained to her very thoroughly. I showed and demonstrated to her that if the gas company would do such a thing it would be more dangerous than putting a dynamite bomb in her cellar and throwing a match at it, for in that case only one person might be killed, whereas, by pumping air into the pipes in the case of natural gas, 1,000 people would be endangered. I do not think a gas company would dare do such a thing. So I say, I think the man whose duty it is to install the fixtures, fittings, burners, etc., in the house of the consumer, can do much in explaining away the prejudices and mistaken ideas which go to form the opinion of the gas company in the minds of many of its consumers. If he will do this, it will surely benefit the condition of the consumer as well as that of the company.

Mr. J. L. Fulton—I do not know that I can say anything of any material value to the members of this Association, although I have been identified with the rise and fall of the gas industry in Indiana for 23 years. I started with gas at 50 cents per stove per month, and at present we are getting an average of 60 cents per 1,000 for natural gas, and my relations with our consumers have never been strained. Our policy has always been to take the consumer into our confidence in advance of any advance in price. We have sent out personal letters to every consumer, frankly setting forth the conditions that ex-

1. For the text of the paper, see *ante*, p. 1119.

isted, showing the impossibility of continuing under old conditions, demonstrating how the gas supply was failing and how it cost more to maintain it, in which way we prepared them for the advance which was to take place 30, 60 or 90 days hence. These advances have always been brought about successfully and without any particular friction with our customers. In the last 5 years—more especially, perhaps, in the last 8 years—it has only been a question of having an adequate supply of gas. I merely make this suggestion because I know from experience and knowledge. Just as many people will use gas at 75 cents per 1,000 as used it at 25 cents per 1,000. It is simply a matter of adopting apparatus to use it economically. I have advanced the price time-after-time, yet the average consumer pays us no more money to-day than he did 15 years ago. There is a reduction in the amount used, through using it in the proper manner, and the income is no larger from the individual consumer than it was before. We have cut the consumption to one-tenth of that which it was. So the salvation of the gas supply of the country depends, in my opinion, upon raising the price and conserving the supply. The last raise in price we made cut off, perhaps, 50 per cent. of our consumers. I knew it would do it at the start. They thought for the time being they could not afford to burn gas as cheaply as other fuel. I knew differently. I knew it would come around all right. As I say, when we made our last raise, it reduced the list of consumers over 50 per cent. In a short while they began to come back. One customer started again to use gas. Becoming satisfied with the situation he convinced his neighbor, after a week or a month's use, that he was getting gas cheaper than other inferior fuel would cost, by using it economically, that it was a more satisfactory and cleaner, and as cheap a fuel as could be obtained. In this way the one customer who became satisfied in turn convinced his neighbor, until in a short time those who had discontinued renewed their contracts. It is only a question of supply and not price. Could we all adopt these higher prices it would conserve the supply of gas and make it not only bring as much money to the present company at the present time, but it would leave natural gas for the use of posterity, because in this way the conservation of the supply would render it all the more inexhaustible. I think it is one of the providences of the Almighty that He intended natural gas to last 1,000 years instead of 100 years, and the shame of it to me is that we did not appreciate this situation 15 years ago in Indiana and conserve the supply as we should have conserved it, by going before the Legislature and securing the enactment of efficient protective measures. [Applause.]

The President—I may say that "The Dominion Gas Company, of Canada," sells gas for domestic purposes at 50 cents per 1,000, and the average bill of the consumer is no greater than in Mansfield, where they sell it at 25 cents, or in Newark, where they sell it at 18 cents.

Mr. Jones—Is it as great?

The President—About the same.

Mr. Sweetman—I am afraid the members here did not fully appreciate what Mr. Jarvis said a while ago. Mr. Jarvis, while not an orator, said something right to the point, which was also one of the chief points in the very valuable paper presented by Mr. Bigelow, that the gas company should be close to the merchant. Mr. Jarvis is a plumber and not connected with a gas company. He was simply taking the side of the gas company in disabusing the minds of the consumers of their prejudice, in explaining to the lady referred to that the gas company could not put air into the pipes. If every plumber, gasfitter or merchant handling stoves were educated so as to say the right thing to the consumer, just as this gentleman said it, it would be a great thing and would also be just it line with one of the thoughts running through Mr. Bigelow's paper.

Geology as Applied to the Formations in which Natural Gas is Found in the Appalachian Regions.

[A paper read by Prof. John Adams Bownocker, at the meeting of the Natural Gas Association of America.]

Introduction.—Had the selection of a subject been left to the writer, one less pretentious would surely have been chosen. Naturally a speaker likes to comply with the request of guests, but a satisfactory discussion of the assigned topic would take much more of your time than those most interested could allow. In turning the matter over in my mind it has occurred to me that it will be best to limit myself to those phases of the subject which are most fundamental and from which more detailed study must start. Possibly what will be said may already be familiar to many of you; if so your patience is asked for the benefit of those who have not been able to familiarize themselves with the fundamental principles of the geology of the great area of which I have been invited to speak.

With even the restrictions proposed I cannot attempt to speak of the whole Appalachian field, but only of the northern part, that is of Pennsylvania, West Virginia, New York and Eastern Ohio. However, which is by far the most important, for in 1907 the value of its production of natural gas was about 85 per cent. of the total for the United States.

Kinds of Gas Producing Rocks.—These are of four in number: Conglomerates, sandstones, shales and limestones. The first three are all a result of the same process, viz., the wearing away of the land. This is accomplished by rain, wind, frost, waves, etc. When once this waste material reaches a large body of water, such as the ocean, it is deposited, the coarsest material as gravel near the shore, the finer material as sand a little farther out, and the finest material as silt in still deeper water. Sometimes, however, both sand and silt are dropped in such shallow water that they are exposed when the tide is out. Later these loose materials may be cemented to solid rock by lime, iron or silica in solution in oceanic waters; the gravel forming conglomerate; the sand, sandstone; and the silt, shales. Pressure may aid in producing this change, especially so with the shales.

Exposures on a hillside, or a log of a well, show not only these rocks, but their repetition one or more times. How has this been produced? Let us hypothecate a slight and gradual sinking of the land along the shore line. The water covers what was before dry land and the coarse material or gravel is now deposited on a new foundation, while the sand rests on gravel or conglomerate and the silt on sand or sandstone. If the shore line rises the position of the deposits is again changed and this time toward the sea. The result is a bed of coarse material deposited over one of sands or even shales. In this simple way the sequence of rocks so well known to all drillers may have been produced. The thickness of the various beds is largely a factor of time, the longer the period of deposition of one kind of material in one place the greater the thickness of the beds. Hence stability of shore line means uniformity in the sequence of rock formation, conversely instability produces change.

Limestones may be formed in two ways, but probably these always work together to a greater or less extent. Some limestones consist of a mass of shells cemented together and in such cases the origin is clear. Other limestones may not contain a single shell fragment. These may be composed of shells that were ground to an ooze by the waves dragging them over each other, or they may have been formed by precipitation, for the oceans contain an immense quantity of lime in solution. After the limestones have been formed they may undergo important changes, giving up part of their carbonate of lime and taking up carbonate of magnesia. Such limestones are known as dolomites.

Early Geological History.—In early geological times the territory considered in this paper was a great inland sea. To the east lay the Piedmont belt, one of the oldest lands on our continent; to the west were the Silurian lands of western Ohio, and to the northeast the Adirondack mountains. The area and shape of this sea changed somewhat from time-to-time, but in the main they decreased with age, and at or near the close of the carboniferous became dry land.

Into this sea sediments washed from the west and north, but especially from the east. These were spread unequally over the floor, the deposits being thickest along the eastern side; that is, near the principal source. In this way formation was laid on formation, the rocks changing in character from time-to-time as previously explained. Occasionally the land arose along the shores, thus narrowing the sea and decreasing the area over which sedimentation took place. It follows from this that rocks were forming in the middle of the sea long after the process had ceased along its early shores, hence that the youngest rocks are to be found near the middle. It might be further concluded that the rocks are to be found near the middle. It might be further concluded that the rocks are also thickest in this portion, but the heavier deposition farther east (near the source) more than counterbalances.

As the sediments were deposited they conformed in a general way to the old sea floor; that is, their surface was trough-shaped, and this characteristic still prevails. In other words, the rocks on the west side of the area dip to the east, those on the east side to the west, and those on the north side to the south. Illustrating this point further, we may say that the rocks which underlie Columbus, and hence are far above sea level, are hundreds of feet below sea level in Western

Pennsylvania, but rise again to the surface in the central part of that State.

The rocks of this territory were lifted above the sea by the great movements which produced the Appalachian mountains, but that phase of the subject cannot be considered to-day. It is worth mentioning at this time, however, that the minor folds with which natural gas is so often associated, probably date from this period, and were formed in the same general manner as the great folds of the mountains.

Age of Gas Producing Rocks.—These range from the Cambrian, or oldest rocks, that are distinctly fossiliferous, to the most recent; but in the Appalachian field the upper limit is the Carboniferous. These rocks represent an immense difference in age, and if the gas which they contain dates from approximately the time of the origin of the rocks, it follows that the gas also varies greatly in age. The following shows the principal gas producing rocks of the Appalachian field and their relative ages:

Carboniferous. Coal measures	First Cow Run sand.
	Macksburg 500-foot sand.
	Clean conglomerates or salt sand.
Lower carboniferous.	Big Injun sand and conglomerate.
	Berea grit.
Devonian. Upper	First sand (100-foot or Gantz).
	Second sand.
	Third sand (Gordon).
	Fourth sand.
	Fifth sand (McDonald).
	Sixth sand.
	Warren sand.
	Clarendon sand.
Lower	Speechly sand.
	Bradford sand.
	Kane sand.
Silurian	Clinton sand.
	Medina sand.
Ordovician	Trenton limestone.
Cambrian	Potsdam sand.

The Gas Producing Rocks of the Appalachian Field.—Probably in no way can I spend a little of your time more profitably than in discussing these formations, pointing out where they are known to be productive, their character, continuity and accessibility to the drill. Cambrian. Rocks of this age are the lowest that are distinctly fossiliferous. Still lower, and yet above the Archean, is a great group known as the Algonkian, but these have no well preserved fossils, or at any rate none have been discovered. Even the Cambrian strata lie so deep in the territory we are considering to-day that they have been struck by the drill at only one place, viz., near Oswego, N. Y., on the extreme southeastern corner of Lake Ontario. Nearby stand the Adirondack mountains of great age, possibly dating from the Archean, and composed largely of igneous rocks. On the southwestern slopes of these ancient mountains lie younger rocks, and first in order is the Cambrian, the older Algonkian rocks being there absent.

In this sandstone, gas in small quantities has been found at a few places. The rock resembles those containing gas in Pennsylvania and West Virginia, and the drillers were quick to apply names to it that they had used in those States. In one well the closed pressure was 340 pounds, and in another it was reported to be 800 pounds. In one well at least the drill did not come to rest until it had penetrated the Archean, which we may appropriately call the foundation of the earth's crust. The interval between the base of the Trenton and the Archean is there only 150 feet, and composed of sandstone above with limestone below.

While these wells were of little value from the commercial standpoint, they are of great interest in that they show gas in older rocks than were before known to be producing. The Cambrian formation probably underlies the whole Appalachian field, and possibly may contain gas at various points, but its depth is such that the driller need not attempt to reach it.

Ordovician or Lower Silurian.—The strata of this period consist of great beds of limestone and shale with some sandstone. In our territory these rocks reach the surface at one place only, northeastern New York. As you all know, the Trenton limestone of this period was a large source of natural gas in northwestern Ohio and eastern Indiana, but that territory lies beyond our province. In that part of New York where the Cambrian gave such surprising results the Trenton, too, is gas producing. In fact, it has been the best source of this fuel in the State. Gas is found near the top of this formation and near the bottom. Strange to say it behaves like shale gas, that in nearby wells show little or no connection. One of these gave the enormous rock pressure of 1,540 pounds, being, with very few exceptions, the greatest on record. While this territory is important locally, it cannot be considered a large source of natural gas.

The Trenton limestone is one of the great formations in our territory. In northeastern New York it measures about 650 feet in thickness, and in southern Ohio 860 feet. The magnitude of the formation, its resistance to the drill, and the fact that it underlies a great bed of shale, make it a geological guide or key rock of the first importance. It probably underlies the whole Appalachian region, but at such depths that it has been found at but few points. Around Columbus it may be struck at about 1,950 feet, but all efforts to reach it farther east in Ohio have proved unavailing.

The higher formations of the Ordovician, namely the Utica and Hudson shales, occasionally give a small flow of natural gas, but they do not merit more than passing mention to-day.

Silurian.—Two formations of this period produce gas in commercial quantities. These are the Medina and Clinton sandstones. The former is not a large source, but in an irregular strip extending from the vicinity of Rochester westward to Buffalo, small wells are occasionally found. The sand is of moderate grain and has a light brown color.

The Clinton sandstone must be classed with the important sources of natural gas. The rocks outcrops in southwestern Ohio and is there a crystalline limestone. In places it is covered with a bed of marly clay and elsewhere in this State with a lean bed of iron ore. The numerous wells in northwestern Ohio found it in its proper position, consisting of limestone with some shales. Gas was occasionally found in it, and at Fremont, when the underlying Trenton proved barren, a number of wells were drilled to the Clinton, these being the first sunk to that formation in this State for natural gas.

The Clinton outcrops in western New York, and is well shown in the Niagara gorge and along the escarpment at Lewiston. It is there a crystalline limestone comparable to that of southwestern Ohio. It is also found in Central Pennsylvania, having been brought to the surface by the great erosion of the Appalachian mountains.

From its outcrops in southwestern Ohio the rock dips to the east, and in New York to the south, and is soon deeply buried beneath later formations, but in Central Pennsylvania it again rises to the surface, as was stated in the last paragraph. Throughout much of this area the rock is so deeply buried that it has never been penetrated by the drill.

In central Ohio the rock is no longer a limestone but a clean, white sand, averaging nearly 25 feet in thickness. Between this rock and the overlying Niagara limestone are blue and brown shales which may attain a thickness of 200 feet. The lower part of these contain some carbonate of lime, the amount being largest directly over the sand. Our information concerning the rocks below the Clinton sand is not so satisfactory, since the drill does not commonly penetrate them. Such data as we have show from 10 to 35 feet of dark shales succeeded in turn by a bad of dark red ones, the latter being credited to the Medina. The great limestones (Niagara, etc.) overlying the Clinton commonly range from 700 to 900 feet in thickness, and, of course, serve admirably as a guide to the driller, aiding in this way in the Silurian much as the Trenton does in the Ordovician.

As has already been stated this formation is one of the important sources of natural gas, but the known productive territory is limited to Ohio. Its discovery and development are an interesting story. No gas springs or gas escaping through crevices in rocks indicated the presence of great fuel wealth below. Likewise no known anticline or terrace suggested suitable structural conditions. It was simply a case of faith backed by money and energy.

The discovery at Findlay, in 1884, produced excitement among the seekers for underground fuel wealth in every part of Ohio, and for that matter in different States. Companies were formed in county after county, the watchword being not as it had been years before, "Pike's Peak or bust," but down to the Trenton limestone. In 1886 a well was begun at Lancaster, and the gas rock struck in February of the following year. The result was a small flow of gas from the Clinton, but, small as it was, it showed the presence of the desired fuel and made certain further tests. This was the beginning, and since then the drill has been constantly at work with results known to all.

The rock pressure usually ranges from 700 to 800 pounds per square inch, the pressure increasing eastward—that is, with the depth, but at an undetermined rate. The largest wells reported had an initial open flow of 12,000,000 cubic feet per day, and wells of from 2,000,000 to 6,000,000 cubic feet have been quite common.

The quantity of gas taken from this field is almost incredible. It supplies numerous towns and cities from Norwood, a suburb of Cincinnati, to Sandusky on the lake, and from Cambridge, in eastern Ohio, to places not far from the Indiana line. It heats and lights thousands ot residences, many factories of various kinds, glass houses, potteries and even brick and tile kilns. This enormous demand has been supplied only by constant drilling and the extension of the territory. As soon as new producers cease to be found the cry "insufficient gas" will be heard and the end will be near.

The depth of the Clinton sand in this field usually ranges from 2,000 to 2,500 feet. Eastward the depth increases rapidly and soon becomes practicably inaccessible; a most important fact for the operator. The reason for this will be made clear when the rocks of the next period are reviewed.

The Devonian.—The variations in the nature of the rock, that have been referred to in the preceding paragraphs, are small and unimportant when compared with those of the Devonian. In Ohio the rocks of this period consist of a bed of limestone, about 150 feet in thickness, and outcropping as a narrow band from about 25 miles south of Columbus nearly due north to Lake Erie. Kelley's Island in that body is simply a large block of this formation. The walls of the State House in this city are composed of this rock and was quarried a mile or two west of this hall.

Overlying this limestone is a thin bed of shales known as the Olentangy, and above these in turn are the Ohio shales. For simplicity the two will hereafter be called by the latter name. These outcrop in the central portion of Ohio, from near Portsmouth on the Ohio river, due north to the Lake. Along this line the formation is thin, but eastward it thickens rapidly, becoming over 1,700 at McConnellsville, on the Muskingum river, an increase of 24 feet to the mile. Farther east in Ohio the bottom of these shales has never been reached, but they have been penetrated to a depth of about 2,500 feet in the vicinity of East Liverpool. Along the Ohio river, from Wheeling to Sistersville, this formation is probably at least 3,000 feet thick. It is well to think of these shales, so far as Ohio is concerned, as a wedge shaped with the apex in the central part of the State the base being along the Ohio river. It is the rapid thickening of this formation that increases the depth of the Clinton in eastern Ohio. Thus at Lancaster the driller has to penetrate only 700 feet of Ohio shales, while, as already stated, along the Ohio river he must probably pass through 3,000 feet.

There are those who are trying to reach the Clinton sand in the extreme eastern part of Ohio, and some are bold enough to start for the still deeper Trenton. To all such the great Ohio shales alone present an insuperable barrier.

It may be well to state here that the Ohio shales appear to consist of shales alone. In other words, they do not contain beds of sandstone. These shales contain, at places, small quantities of gas, a number of houses and occasionally a village along the shore of Lake Erie being lighted in this way. The supply of gas for Fredonia, the first town to be lighted in this manner in the United States, came from this horizon.

In Pennsylvania and West Virginia the condition is far different, for the shales corresponding to the Ohio contain numerous beds of sandstone, which are among our largest sources of both oil and gas. Near Franklin, Pa., the thickness of these shales and interbedded sandstones exceeds 3,600 feet. The thickness increases southward, and has never been penetrated by the drill, except in the southwestern corner of West Virginia, where the formation thins. The lower part of this great formation contains in its upper part a number of gas sands, such as the Speechly, Bradford and Kane. These are important producers of gas in Pennsylvania, but not in West Virginia. Beneath these lies a great bed of shales of unmeasured thickness throughout much of these two States. The upper part of the Devonian is much more prolific in gas rocks, including those numbered from the First to the Sixth and the still deeper Warren and Clarendon sands. These are large producers in both Pennsylvania and West Virginia.

As you all know the driller moved westward from Pennsylvania into Ohio, and when oil and gas were found in the latter State as far down as the Berea, an effort was made to find the deeper beds of Pennsylvania. In fact wells with this object are still occasionally sunk, but the results have been uniform failure. It may be considered as settled by the drill then, when the Berea has been passed in eastern Ohio, all hope of oil or gas is gone.

The Carboniferous.—We have now reached the last great period of the Appalachian field. Economically it is of the first importance, for it contains the greatest coal beds of the planet as well as invaluable deposits of clays, oil, gas and salt. It is customary to divide the rocks of the Carboniferous period into three great groups:

3. Permian.
2. Coal measures.
1. Lower carboniferous.

Of these the lower carboniferous is a large source of gas; the coal measures less so, and the permian not at all, at least not in commercial quantities. The lower carboniferous rocks outcrop in Ohio as a broad strip from the Ohio river to the lake. In northwestern Pennsylvania they are likewise prominent, and in southern New York they form a broad band as far east as the Hudson river. From these outcrops the rocks dip toward the center of the Appalachian trough, and are soon hundreds of feet under cover.

The lower carboniferous has two important gas bearing members, namely, the Berea grit and the Big Injun sandstone. The Berea grit is one of the best known formations in the country. Near Cleveland it is a large source of excellent building stone, and to the southeast it contains valuable deposits of oil, gas and salt. The formation is wonderfully persistent and can nearly always be found where due in this State. In Pennsylvania it is easily recognized in the well records in the northwestern part of the State, but farther south its identification is uncertain. The situation is similar in West Virginia, where the sand is found in nearly every deep well along the Ohio river, and is often a source of oil and gas, but farther in the State it either disappears or is confused with another formation. The Berea is one of the key rocks in eastern Ohio and northern Pennsylvania. Below it lies a thin bed of shales, often brown in color, and beneath this lie the great Devonian beds, already reviewed.

The Big Injun lies about 400 feet above the Berea. Sometimes this formation is one great bed of sandstone; sometimes it is pebbly in places. Elsewhere it is broken by two beds of shales, and then the upper sand is known as the Keener, the middle as the Big Injun, and the lower as the Squaw. In northern Pennsylvania the formation is known as the Sub-Olean conglomerate. The combined thickness of these beds may exceed 300 feet. These rocks yield gas in southeastern Ohio, southwestern Pennsylvania and in West Virginia. The top formation of the lower carboniferous is a great limestone known among the drillers as the mountain limestone or big lime. Along its outcrop in Ohio it is called the Maxville limestone and in West Virginia the Greenbrier limestone. In southeastern Ohio it may exceed 75 feet in thickness and in West Virginia still more. This formation is not a gas producer in the commercial sense, but it is of great value as a key rock. Below it lies the Big Injun, so that when the driller strikes the "lime" he knows quite definitely his position.

As has already been stated, the Coal Measures are not a large source of gas. The rocks of this division consist principally of shales and sandstones with numerous coal beds. The lowest member of the division is the Pottsville conglomerate, but in the deep wells of eastern Ohio and the adjacent part of West Virginia its pebbly nature is usually wanting and it is there commonly represented by shales and sandstones. When the latter rests on the "big lime" it is called the Maxton sand, but if higher up the Salt sand." In northwestern Pennsylvania the formation is known as the Olean conglomerate.

Still higher in the geological column lie such sands as the Macksburg 500-foot and the Cow Run. In fact the list might be greatly extended, but I will not try your patience by so much as reciting the names. My object in this part of the discussion has been simply to show the principal sources of natural gas in the Appalachian field and their relative positions. The points stated have been well established by the drill.

Relation of Rock Structure to Natural Gas.—Securing a smell of natural gas is a very common occurrence and may be found in many rocks and over broad areas, but finding the fuel in commercial quantities is much rarer. Apparently the gas was not produced simply at a few favored spots but over relatively broad areas, and later was for some reason gathered together in small tracts. Without such a process natural gas as a fuel would probably be unknown.

But how was this segregation brought about? The particles of a gas, as you know, are under ordinary circumstances very active, moving with great velocity in various directions. Our atmosphere is endeavoring to fly away from the earth's surface and were it not for the force of gravity of our planet, would have escaped into space ages ago. Gas in porous rocks appears to behave in a similar manner, though at a slower rate owing to the resistance of the rocks. Manifestly it will seek the higher places in the strata leaving the lower tracts with little or no gas. In this way the fuel that original-

ly extended over a broad area was probably segregated in a much smaller one.

This statement you recognize at once as the anticlinal theory, for the development of which we are indebted to two geologists of the Appalachian field—Orton, of Ohio, and White, of West Virginia, though the tendency of gas to collect in the higher places in the rocks was recognized much earlier, from almost the time in fact that the search for oil and gas began in this country. This theory has been put to the test time-and-time again with favorable results, though all known gas fields have not been proven to be associated with anticlinals, the Central Ohio field for illustration. So far as the writer is informed, however, no important body of gas has been demonstrated to be independent of this structure.

Where the anticline exists the reservoir rock may be wanting or too fine-grained to contain a large body of gas, or possibly the overlying rocks may have been fractured, permitting the gas to escape ages ago. If the anticlinal is a low one, and salt water abundant, as is too often the case, the rock may be filled with this, leaving no room for the gas. Another cause of failure may result from the thickening of the rocks below, and as a result the anticline, which may be well developed at the surface, is entirely wanting at the horizon of the gas-bearing stratum. It is well to remember in this connection that the converse may also be true, so that while no fold may be found in the surface strata a well developed one may exist below.

Rock Pressure.—Perhaps no phase of the subject is so little understood at the present as this. We know the range of pressure, but the cause and the laws of variation are open questions, just as they were several decades ago.

In Ohio the pressure seldom reaches 900 pounds to the square inch, but is reported as high as 1,200 near Butler, in Richland county. Such figures are exceptional and are found only in occasional wild cat wells. Reference has already been made to a well in the Trenton limestone, of New York, recording 1,540 pounds, and Prof. I. C. White mentions wells in West Virginia whose pressure could not be measured by a gauge reading to 1,500 pounds. Further, in one case at least, the gas blew up the 2-inch pipe, which is supposed to stand a pressure of 2,000 pounds to the inch.

Orton at one time thought that the cause was hydrostatic, that is it was due to the weight of a column of water, and hence the deeper the well the greater the possibilities of pressure. This theory fits the facts in northwestern Ohio very well, but it broke down when applied to some other fields. White states that in many of the great gas fields of West Virginia the gas rock is quite free from water.

Others think that the pressure is in some unknown way a result of the expansion of the gas, but this is extremely hazy, and to the writer seems wholly inadequate to account for such pressures as are found. Occasionally one hears a driller express the opinion that the pressure is caused by the weight of the overlying rock. This seems to hypothecate that the gas rock has been crushed, making it much thinner than formerly and compressing the gas. Samples of rock that occasionally reach the surface in "shooting" show, however, that it has not been crushed, and there is no evidence at all, so far as the writer knows, in support of this theory. In fact, all the evidence is against it, and I am compelled to leave off as I began, by stating that the cause of rock pressure is one of the unsolved riddles of natural gas.

Origin of Natural Gas.—Probably some would be dissatisfied if nothing were said on this subject. It is one concerning which geologists are a unit, though there doubtless is difference of opinion as to the process.

Natural gas is always present with oil and large bodies of gas are seldom remote from oil. In other words, these two fuels are intimately associated. Further, they belong to the same great chemical series, and there is every reason to believe that they have had a similar origin.

These fuels are never found except in stratified rocks that are highly fossiliferous, or in rocks that overlie such. Thus, the Trenton limestone shows unmistakably that it was deposited in a sea containing an abundant fauna. The Clinton sandstone overlies the great shales of the Hudson series, rocks that teem with organic remains. The oil and gas rocks of the Devonian overlie or are interbedded in shales that contain much organic matter, and the situation is similar with the oil and gas rocks of the carboniferous. This relation is very suggestive.

Oils similar to petroleum, and others that are obtained by the distillation of petroleum, have been secured in the laboratory from animal and vegetable oils. Thus, about 20 years ago, Engler obtained an oil "Indistinguishable from commercial kerosene," by the distillation of menhaden oil. Twelve years ago Sadtler obtained an oil resembling petroleum and a scale of paraffine by distilling linseed oil under pressure. Other experimenters have gotten similar results.

From evidence such as this, geologists are agreed that natural gas was derived from organic matter; that is, from animals and plants. How the change was brought about, however, is an open question. Distillation has long been maintained by some; but this, using the term in the customary way, requires a high temperature, and this the geologists cannot grant, for in our deepest well, a well reaching a depth of more than a mile, the rocks gave no evidence of metamorphism such as would have probably resulted from a temperature of only 200° F. Further, in the bottom of this well the temperature was little more than 127° F. Such data seems to preclude the heat necessary for distillation. Others think that a low temperature, acting slowly and for a long time, may have brought about the change.

A few years ago Dr. Morrey, of this city, suggested bacteria might have been the agent of change Push a stick into a layer of mud along a stream or swamp and occasionally gas will bubble forth. This is marsh gas, and according to Dr. Morrey has been produced by bacteria acting on organic matter. Marsh gas is the chief constituent of natural gas. He further states that bacteria are producing other though related gases, and that the products from animal and plant remains may show certain differences, such as we find in gas derived from sandstones and limestones. Possibly different types of plants may yield products somewhat unlike. This interesting theory will probably receive more consideration in years to come.

A Final Word.—I cannot close without saying a word to you concerning the short life of gas wells and the great importance of husbanding the supply. Those of you who are of middle age can well remember the beginning of the industry in a commercial way, and yet you have seen the exhaustion of the Trenton field of Ohio and are now witnessing the last days of the same field in Indiana. You have noted the depletion of great reservoirs in Pennsylvania and the rapid decrease in the best territory in West Virginia. Everywhere the drill must be kept at work to maintain the supply. Were it to stop, the cry "insufficient gas" would be raised next winter, and a year later thousands of people would be compelled to return to coal. The multitudes of holes that have been drilled in the Appalachian field have proved that natural gas is to be found only in favored spots and usually of small area. These are our only reliance, and when they have been emptied natural gas for us will be a thing of the past.

The time was, and not long ago, when the gas was shamefully wasted, and this may still be true in those sections where the supply is very large and a good market remote. Nearly every oil well is a source of waste, most of which could be saved and without great expense. Leaky joints are another cause of loss, and this too could be easily remedied. The amount of this, the finest fuel known, that has been wasted is very great, and will be a topic for bitter comment in a generation or two. But there is still another common abuse to which I must refer, and that is the use that is made of the gas. Within a few miles of this hall it is the fuel in burning common bricks and drainage tile; elsewhere it is used in potteries, in steel mills and factories of many kinds. These are plants in which coal should be used and in some of them only the cheaper grades. Would it not be much better to restrict the use of natural gas to domestic purposes? This, of course, would decrease the market but it would very greatly extend the life of the territory. Would not this, together with the larger price received for the fuel, fully compensate for the decreased market? A change of this sort cannot be effective without the co-operation of many producers. This is, therefore, a good place to start, and the time is propitious. Cannot you, the natural gas producers of the United States, take steps which will be a landmark in the use of this fuel and make the Columbus meeting the most notable one yet held?

A very hearty and enthusiastic round of applause greeted the Professor at the conclusion of his paper.

The President said:—Gentlemen of the convention, I congratulate you in having had the pleasure of listening to the very clearest and the very best presentation of this subject of geology as applied to the natural gas industry that I ever heard.

Mr. Jones moved to Prof. Brownocker a hearty vote of thanks for the wonderfully interesting and valuable paper presented by him; further, as a slightly brighter mark of appreciation, that acquiescence in the motion be made by rising vote. [Seconded and carried.]

(Continued from page 1152.)

Difficult Problems which Public Utility Commissions are Endeavoring to Solve.[1]

[By Mr. H. C. Abell, Chief Engineer, American Light and Traction Company.]

Second Problem.

Rate of Return on the Valuation.—Before taking up the rate of return, I will refer to the depreciation and the amount to be set aside therefor. The line of demarcation between depreciation and maintenance is difficult to follow. Some engineers and managers think that maintenance and depreciation should all be an operating expense, as it is essential to keep a plant up to a certain point of repair at all times. They think when a piece of apparatus is replaced, the difference between the amount received for it, either as junk or an old piece of apparatus, and the cost of the apparatus replacing it, should be charged to plant account. Others think the difference between the actual cost of the old apparatus and the new should be charged to the plant account, and that the cost of the old apparatus should be charged off to an operating maintenance account. They also think that the utility enhances in value as the city develops in a larger proportion than the depreciation occurs.

Others think that an amount should be set aside each year sufficient to cover the depreciation according to assumed lives. For instance, to take the example of $1,200 previously mentioned, $50 would be set aside each year for 20 years, if the apparatus should last that long.

There are also various opinions as to how the fund should be treated and financed. The commission, previously referred to, when obtaining present values, used 4 per cent. compound interest curve, knowing that the apparatus had actually reached its present life. As to the future, however, it is difficult to prognosticate what these lives will be; in fact, we are certain that a portion of the plant will not reach the estimated lives of its several parts, and that a portion may be in useful operation long after it has from point of age reached the junk value. It would seem that an amount should be allowed that would cover the probable depreciation with reference to any specific financing of the fund, and the amount be changed, either reduced or increased, as necessity requires and actual experience teaches.

If an amount be set aside each year to cover the probable depreciation, some properties would soon be in the hands of a receiver, as they would be unable to meet necessary obligations. Commissions will have to use their judgment in this matter. The rate of return has to be large enough to induce men of money to invest in a more or less hazardous undertaking. The investment is certain to increase continually as the city develops.

The utility is subject to all the various municipal and State laws which may be passed and enforced, but unlike a life insurance company or other concern, it is not able to move away and still collect premiums from the residents of the State or municipality, or take all of its property with it.

Nearly every utility has strong competition, necessitating continuous changes. In fact, the competition with itself, in many instances, is very detrimental to returns on the investment. For instance, more efficient appliances are frequently brought out, using only 40 or 50 per cent. of the commodity formerly used with old appliances. As the utility still has its investment, capacity and practically the same consumers' expense, it must devise methods and means for increasing the use to its present consumers, increasing their standard of illumination, etc. It is not probable that this can be done, especially to this large extent. To increase sales with additional consumers can be accomplished only with additional investment. The solution of this problem requires the most serious thought and best management.

It is almost unnecessary to make any mention of the changes which entail very heavy depreciation and enormously increased expenditures, without any increase in earnings such as art, municipal regulations, liability to accident, increased cost of material from which the product is manufactured, increased cost of labor, the necessity of continuous operation during the light as well as heavy demands, strikes, changes of plant, etc., when all other manufacturing concerns can shut down.

A public utility is a barometer of the condition of business. When factories shut down, the street railway patronage immediately falls off, light and fuel bills are decreased, all of which means a cut from the net profits of the utility, as its fixed expenses are practically the same.

Third Problem.

Establishing standards of service which will be fair to both the consumer and the utility, and which will be paid for by the consumer in proper relation to the cost which he occasions, and at the same time allow the utility to compete with the various other forms of light, heat, travel, etc., is a problem of large and wondrous dimensions.

In order to arrive at any solution, it is necessary to consult the manufacturer of apparatus and appliances, the operator of the utility, and the user of the utility's product. The opinions and claimed experiences of persons under each head vary greatly; but still more diversified are those of the manufacturer, operator and user. By a study of the opinions, experiences and rules already in force in various places, it is possible to arrive at some tentative rules, regulations and specifications of quality, pressure, accuracy of measurement, etc. As it is the duty of a commission to study the various variables which enter into the cost of a product, and endeavor to arrive at a salable and purchasable mean, they have to ascertain a knowledge of the material from which it is manufactured. For example, the coal available for gas manufacture may have a high percentage of sulphur, and in order to produce a gas which would compare in the amount of sulphur present to another gas from other coal, which might be very high priced but low in sulphur, would so increase the cost of gas that it would be out of proportion for the results accomplished.

The relation between candle power and calorific value varies with the different manufactured gases. For instance, to obtain the same calorific and candle power values with coal gas as are obtained with water gas, might mean an increased cost wholly out of proportion to the results obtained.

An allowable variation of gas pressure of a fixed number of inches of water, whether the pressure is high or low, might work a hardship on either the utility or the customer. By a study of the appliance and the application of the law of the flow of gas through an orifice it is possible to arrive at a mean which is fair. As an example: A rule not allowing over 1½ inches of water differential pressure on any consumer's premises would be an exceedingly close regulation and commercially impossible for a total city distribution system, though it is possible that such a regulation might, if the matter were not thoroughly understood, be inaugurated.

As the flow of gas through an orifice is as the square root of the differential pressure, therefore, increasing the pressure from 1½ inches of water to 3 inches of water would increase the flow 40.6 per cent., while increasing from 3 inches to 6 inches would increase the flow only 41.6 per cent., or hardly more than from 1½ inches to 3 inches. Practically all appliances are built to take care of this variation of 100 per cent., especially the Bunsen or induced air draft mixer. Take the formula

$$\tfrac{1}{2}Mv^2 = \tfrac{1}{2}M^1 (v^1)^2,$$

v being the velocity of the gas leaving the nozzle of the inductor, v^1 being the velocity of the air and gas together after mixture. If v^1 remains constant, and v, the nozzle pressure varies, then with about 40 per cent. increase in velocity, theoretically, about 200 per cent. more air will be drawn in; so, allowing for mechanical loss in efficiency of apparatus, enough air would be brought in to make the proper combustible mixture. A differential pressure of 1½ inches between initial and final pressure would pass 52,000 cubic feet of gas through a mile of pipe, with an investment of $15,840, while a 3-inch differential pressure would pass 73,000 cubic feet of gas, or 40 per cent. more, through the same mile of pipe.

From the above it can be seen that a rule specifying a certain differential pressure as 1½ inches would mean a greatly increased investment and not help the consumer much more than the 100 per cent. allowable variation in pressure from a minimum which is allowed by one commission.

Even the latter allowance, if strictly followed in every case and for all hours of the day, might work a hardship on the customer and the utility by necessitating the payment of interest on a heavy investment for a very short period of use.

It can be seen that the establishing of standards and forcing the utility to comply with them in every particular, is a problem for engineer, financier and economist.

Equitable charging would have to be based on the cost of the consumer to the utility, in order that each consumer might bear his proper proportion of the expense which he occasions. As

1. "The Armour Engineer."

an example; a large store may have a demand of 400 16-candle power lights and only use them on an average of 1 hour per day; whereas, a small concern may have a demand of only 20 16-candle power lights and use them 24 hours per day; each would consume the same amount of current; each consumer's expense would be approximately the same; the output expense for current consumed would be approximately the same; but the capacity of the generating plant equipment, lines, transformers, etc., would be 20 times more for the large store than the required capacity for the smaller concern. It is, therefore, necessary to subdivide the expense in order to ascertain what the expense of an additional consumer will be, what the fixed expense will be per unit of capacity demanded, and the cost of the commodity per unit sold.

There are some expenses which are common only to the consumers, such as reading meters, delivering and collecting bills; others, proportionate only to output, such as coal carbonized for gas manufacturing; and still other expenses proportionate to output and capacity, such as steam. A part of the steam is used to operate exhausters, which take gas from the hydraulic main. The amount of work performed is in proportion to the gas made; whereas, the amount of steam used for heating the buildings and keeping the holder cups from freezing in the winter, is not in any way influenced by the amount of gas manufactured by that capacity of plant. To go into the several items of expense and endeavor to arrive at a correct subdivision would take considerable space. As an illustration, I will touch on one or two items:

The steam account for electric generation is very difficult of analysis between fixed and output expense. If engines were operated continuously at the most economical load, the cost per unit generated would be less than at variable loads, which actually occur in an electric plant. Boilers are frequently banked, and all the fuel used for banking fires or starting up a boiler each day for peak loads is probably a capacity expense. Engine and dynamo labor, and frequently boiler room labor, would be no greater if all the engines were running continuously at 100 per cent. load factor. It can be very plainly seen that as the load factor increases the operating expenses are decreased per unit of electricity sold.

In order to approximate a correct proportion to be charged to capacity, it would be necessary to assume for a basis some ideal load factor.

There is a great diversity of opinion regarding the division of general expense which usually includes executive salaries, general office expense, general office clerical salaries, office rent, legal expense and an incidental general expense, like the publishing of annual reports, stockholders' meetings, etc. Some accountants call this a contributory or overhead expense and divide it in proportion to the sum of manufacturing, distribution and collection expenses, which are subdivided into capacity, consumers and output.

The interest on the investment is frequently subdivided in the same proportion between the capacity, consumers and output, as the example of the general expense just given.

A tentative summary of the division of yearly expenses for a gas plant are given below:

	Capacity.	Consumer.	Output.
Manufacture	$2,288.65	.....	$38,839.00
Distribution	7,531.79	$12,929.92	1,917.00
Collection	230.66	3,775.35	....
Operating expense, except general expense	$10,051.10	$16,705.27	$40,756.00
General expense	2,156,74	3,594.57	3,626.98
Depreciation	8,405.00	1,845.00	2,000.00
Rate of return	7,460.09	12,500.62	30,445.22
	$28,072.93	$34,645.53	$81,828.20

$1.27 per meter, $8.45 per consumer, 78 cents per 1,000 for gas.
22,000 meter light capacity connected, 6 cubic feet per light.
4,100 consumers.
105,000,000 cubic feet of gas annual sales.

From the foregoing figures the fixed charge for the various connected capacities would be as follows:

5-light meter per year	$14.80
10- " " "	21.15
20- " " "	33.85
30- " " "	46.55
45- " " "	65.60
60- " " "	84.65
100- " " "	135.45

Besides the above fixed expenses the consumers should pay 78 cents per 1,000 cubic feet for gas.

A complete analysis of the consumers' accounts should now be made, together with their connected capacities for demand; then, by taking the maximum rate per unit for the commodity at that time in force, and applying the following equation:

$$A + Bx = Cx$$

it is possible to see how many of the customers should have their bills raised or lowered.

A = Yearly charge on the connected load or demand.
B = Output cost of gas.
C = Maximum rate per 1,000 cubic feet then in force.
x = Number of cubic feet of gas used per year.

Example: Assume a 5-light meter was installed and that the maximum rate for gas was $1.25 per 1,000 cubic feet. How many cubic feet per year would a consumer have to use in order to pay the company all expense which he occasions it, together with a proper rate of return on the investment, when the capacity expense is $6.35, consumer's expense $8.45, and output price of gas 78 cents per 1,000 cubic feet?

A — $6.35 + $8.45 = $14.80.
B — 78 cents.
C — $1.25.
$14.80 + .78x = $1.25x.
x = 31,500 cubic feet per year.

By the foregoing method it is found that 80 per cent. of the total consumers had not been paying the amount which they should.

The difficulty of obtaining and installing rates which are fair and equitable and at the same time sufficiently satisfactory to the prospective customer who is not now, but after a proper introduction to the use of the commodity, may become a very profitable consumer, is obvious. There are many rates in use and it devolves on a commission to study them all, together with an analysis of costs, and endeavor to arrive at something which will be the most equitable for all concerned, a task which is more than arduous.

Fourth Problem.

To increase the rate of return to the public utility in some proportion to the decreased cost to the public.

There are several methods now used, or proposed, to accomplish the above results, based on the "London Sliding Scale," or some modification of it.

The first part of the problem is to set the initial price, which, of necessity, has to be fair, whether it be a maximum or average price per unit for all the commodity sold. After solving problems two and three, the price will be fairly well determined for an established concern. To obtain this price requires study and investigation, and a thorough knowledge of all the factors for each specific case. The cost of material from which the product is produced varies, as do practically all the factors which go to make up the cost. The price has to be sufficient to take care of any normal fluctuation, without working detrimentally to either the customer or to the utility. Whenever any abnormal variation in the price of material, etc., occurs, it has to be taken care of by some other means. Sometimes a certain per cent. is set aside in a reserve fund until it reaches a certain amount —a percentage of the investment, gross earnings or some such basis. This fund is kept to take care of variations in price of manufacturing material, decreased earnings in bad years, etc.

A solution of Problem No. 2 will give the initial percentage to be allowed as a rate of return on the investment, after which the ratio of increased allowable net earnings to decrease in price will have to be determined.

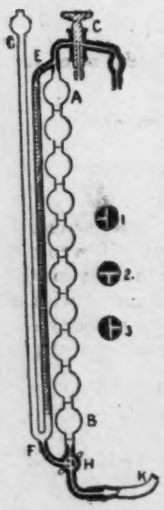
As the price is decreased it becomes more and more difficult to make further reductions, hence a commission has to determine whether these increased premiums to the utility should be on a differential scale to stimulate greater effort on the part of the utility to improve the physical and financial service to the public, or whether some permanent arrangement should be enforced allowing a utility a fixed per cent. increased net earnings, with a specific decrease per unit of the commodity sold.

Whatever method of increasing the rate of return is used, it will have to include the consideration of the availability of service, extensions in new districts, etc.

I have suggested but four general problems. As has been seen, each of these involving many intricate and difficult questions which will undoubtedly require many years of study and labor to properly solve.

New Form of Gas Burette.

[By Mr. Arthur Edwin Hill, in *Jour. Chem. Soc.*, England.]



To augment the degree of accuracy to which a straight tube gas burette can be graduated, it is necessary to enlarge the scale by increasing the length and reducing the diameter of the burette. The advantages thereby attained are, however, more than counteracted by the disadvantages resulting from the unwieldy proportions of the apparatus and consequent difficulty of keeping its contents at uniform temperature. No increased accuracy can result from a mere reduction of the diameter of the burette, if unaccompanied by a proportionate decrease of its length, for its capacity is alone thereby reduced and the percentage error on the reduced volume of gas measured retains its former value.

An attempt has been made to devise a new form of gas burette, which, although quite compact, can be graduated to a higher degree of accuracy than the ordinary form. It is indicated in section in the figure, and consists of the vessel, *A B*, made up as shown, of a series of 10 bulbs, each with a capacity of 10 c.c., connected by short, narrow tubes, on which graduations are marked. This vessel is sealed at the top to the 3-way capillary tap, *C*, which is especially adapted for controlling the flow of gas between the burette and the absorption pipette. The double tube, *E F G*, consists of the measuring tube, *E F*, which is sealed to the upper end of the vessel, *A B*, and has a capacity of 10 c.c. graduated into twentieths of a c.c., and the leveling tube, *F G*, which serves for adjusting the pressure of the gas inside the apparatus, to correspond with that of the atmosphere outside. The vessel, *A B*, and the side tube, *E F G*, are sealed at the bottom to the 3-way tap, *H*, which serves to control the flow of water between the burette and the leveling reservoir connected with the lower part of the tap by the rubber tube, *K*, but not shown in the figure. The method of working is very simple and is as follows: To fill the burette with water, the tap, *C*, is opened and the tap, *H*, is turned into position (1), whereby connection is made between all parts of the burette; the reservoir is now raised until the water fills the burette and reaches the tap, *C*, which is then immediately closed. Before a sample of gas is drawn into the burette, the tap, *H*, is turned into position (3), whereby the double tube, *E F G*, is disconnected from the reservoir—at this moment it is advisable to close the opening at the top of the tube, *F G*, to prevent the contents from being disturbed by the partial vacuum in the vessel, *A B*. When sufficient gas has entered the vessel, *A B*, the tap, *C*, is closed, and the reservoir is raised until the water reaches the nearest graduation mark in the vessel, *A B*. The tap, *H*, is now slowly turned into position (2), whereby the double tube, *F F G*, is connected with the reservoir, the vessel, *A B*, disconnected from it, and a part of the gas which was compressed in the vessel, *A B*, is allowed to pass over into the measuring tube, *E F*. The pressure of the gas in the burette is then adjusted by lowering or raising the reservoir until the level of the water is the same in both parts of the double tube, *E F G*. Its volume can then be read off in twentieths of a c.c. from the combined readings of the vessel, *A B*, and the measuring tube, *E F*. Both these readings are equally accurate, since the measuring tube, *E F*, has the same diameter as the short connecting tube on which the graduations of the vessel, *A B*, are marked.

To proceed with the analysis of the gas, the burette is connected to an absorption pipette, the tap, *H*, is turned into position (1), and the gaseous contents of the burette are driven over into the pipette by opening the tap, *C*, and raising the reservoir. When absorption is complete, the tap, *H*, is turned into position (3), and the gas is returned to the vessel, *A B*, by lowering the reservoir, its volume being then measured in the manner already described.

By applying a simple modification of the foreging principles, it is possible to devise a very accurate volumetric burette for measuring the volume of liquids in experimental work where a high degree of accuracy is required. It is doubtful, however, whether it would be of real utility for volumetric analysis, in view of the considerable magnitude of the errors introduced by the use of indicators.

The new form of burette combines the following advantages: (1) It has $\frac{1}{10}$ the number of graduations which would be required on a straight-tube gas burette with the same capacity and graduated to the same degree of accuracy. (2) A very open scale is provided on the measuring tube, *E F*, on which $\frac{1}{10}$ of a c.c. is represented by a length of more than 1.5 millimeters. (3) The apparatus is very compact, measuring not more than 16 inches between the taps, *C* and *H*, and can therefore be fitted into a thermo-jacket of very moderate dimensions.

Rules for the Government of Employees of the Baltimore City Department in Charge of Lamps and Lighting.[1]

1. District Superintendents will patrol the district to which each may be assigned, night and morning, and maintain a thorough and practical supervision over the street lighting system of the city, in order that the very best service may be obtained at all times. They must report all defective street lights in their respective districts and fully explain in their reports the cause of such defects.

2. They must see that the lanterns, globes, bottom glass, street signs and other lamp fixtures are properly adjusted and are kept thoroughly cleaned at all times, and must report any failure on the part of the contractors or their employees to properly perform this work.

3. They must see that the street lamps are lighted each night, and extinguished each morning, strictly in accordance with the official schedule of lighting issued by this Department, and report any failure of the lamplighters to comply with this requirement.

4. They must thoroughly acquaint themselves with each and every condition in their respective districts bearing upon the work of this Department, in connection with the lighting service, and must make such recommendations as in their judgment will improve the street lighting system.

5. They must keep an accurate account of the number and location of all gas and naphtha street lamps and unused lamp posts in their respective districts, and be prepared to furnish the Superintendent of Lamps and Lighting information as to the exact location of each lamp and unused lamp post.

6. When new street lamps are ordered by the Superintendent of Lamps and Lighting, the District Superintendents must see that they are placed in the exact location ordered, and that the pavement at the base of each post is put in proper condition and report in writing to the Department when these lamps go into service. Lamps should not be placed against trees, telegraph or telephone poles.

7. They must keep an accurate account of all street lighting equipment, and must specify that portion of it that belongs to the city and that owned by the contractors. They must report to the Department all broken or wrecked lamp posts and fixtures found in their respective districts, and see that all needed repairs are promptly made by the contractors, including the repair of the pavement at the base of all posts.

8. They must see that all the street signs attached to houses in the electric light districts of the city are properly adjusted, and must report to the Department any such signs that may be found hanging or out of place, giving the location where such signs are to be found. They must report to the Department the necessity for street signs in such localities of their respective districts, where, in their judgment, the convenience of the public may demand, and must specify whether for street lamps, houses or unused lamp posts, giving the location where such signs are to be placed.

9. The District Superintendents will be required to make a lamp-to-lamp inspection every 3 months in the year, and must report all defects found and all repairs needed. The method of this inspection must be conducted in the daytime, and with the assistance of the lamplighters.

The District Superintendents, with the assistance of the lamplighters, will examine, in the most thorough manner, each street lamp, and must carefully note and report every defect found in connection with the lantern, burner and lamp post. They must note and report every lamp post found leaning, and report any defects found in the pavement at the base of each lamp post. They must also report the necessity for painting the lamp posts and fixtures.

After this inspection has been made, and the reports, setting forth the necessary repairs to be done, submitted to the Superintendent of Lamps and Lighting, the District Superintendents must follow up this work, and see that all repairs are made by the contractor in a manner satisfactory to the Department.

10. They must acquaint themselves with, and keep a correct record of, the location of all stores dealing in and selling at retail, coal oil, in their respective districts, and must collect at least three samples of coal oil each day from different dealers. They must also collect sam-

1. Printed by request.

ples of oil from the delivery wagons of all companies and persons engaged in selling oil to local dealers.

11. They will be required to take monthly statements or readings of gas and electric meters located in all municipal buildings, markets, etc.

12. Any District Superintendent who may be found guilty of any irregularities in connection with the collection of samples of oil will be promptly dismissed.

13. District Superintendents must report to the Department each morning not later than 9 : 30 o'clock.

14. Any District Superintendent who fails to comply with these rules in any particular will be dismissed.

Inspector of Gas Meters.—The Inspector of Gas Meters will perform the work of inspection strictly in accordance with the provisions of the law bearing upon the inspection of gas meters. He must exercise the greatest care, not only in his inspection of the meters, but in the preparation of his reports and records bearing upon every detail in connection with his inspection, testing, sealing, etc., of each meter, so as to avoid any errors which might give rise to confusion.

Collector of Gas Meters.—The Collector of Gas Meters must be careful in removing and replacing all gas meters in the premises of the consumers. In disconnecting the meter from the supply pipe, at the residence of the complaining consumer, the utmost care must be taken by the mechanic or collector that all stopcocks and gas burners throughout the house are turned off. He must be particularly careful in turning off the gas supply where it enters the cellar from the street, so as to prevent the escape of gas. In replacing gas meters in the premises of the consumers when same have been found to be correct, the collector or mechanic must be careful to make the necessary connections to the service pipe of the company in a manner that will insure perfect safety against the escape of gas.

Before turning the supply of gas into the meter he must insist upon the occupants of the house to examine every gas burner in the house and see that the gas burners or stopcocks are all turned off. When he has received assurance from the occupants of the house or place of business that all gas and stopcocks throughout the house or place of business are all turned off, he will turn the supply of gas into the gas meter and will then make his usual test for the purpose of finding any leaks of gas or other defects that may exist, and must resort to any other method which in his judgment will insure perfect safety against accidents of any kind.

Necessary materials, such as washers and other material, must be at all times in the possession of the collector or mechanic, so as to be ready for all emergencies. Before removing the meter from the premises of the consumer, the collector or mechanic must call the attention of the consumer to any defects that may be discovered in the meter.

Inspector of Gas and Oil.—The Inspector of Gas and Oil will make all inspections of gas and oil strictly as required by the provisions of the law bearing upon the subject.

He must inspect at least 20 samples of oil daily.

He must inspect at least 12 gas burners, which are to be taken from the street gas lamps and delivered to him by the mechanic of the Department every 2 weeks.

He must keep correct records of all tests of gas, oil and gas burners.

He must enter in a book, kept for that purpose, each day the statement of the result of all gas meter tests made in the Department.

He must also perform such other duties as may be ordered from time to time by the Superintendent of Lamps and Lighting.

The Inspector-at-Large.—The Inspector-at-Large must keep general supervision of the gas, naphtha and electric arc light service throughout the city, ascertain the cause of all defective lights, and where it is within his power to do so he must correct the cause of the trouble; otherwise he must call the contractor's attention to the existing defects that the same may be adjusted promptly.

He must recommend any alterations or repairs of the lamps which he may find to be necessary for the improvement of the general lighting service. He must superintend the erection of all additional electric, gas and naphtha lamps which may be ordered from time to time throughout the city, and also superintend all alterations, repairs and readjustments of such lamps and equipment, and must report to the Department any failure on the part of the contractors or their employees to execute the work properly.

He must perform any other service that may be ordered from time to time by the Superintendent of Lamps and Lighting.

The Koppers' Coke Plant at Gary, Ind.

As our readers are aware the United States Steel Corporation erected 280 ovens on the Koppers' system at the Joliet plant of the Illinois Steel Company, and it would look reasonable to infer that these have given every satisfaction to the Corporation, which has decided to erect 560 on the same type at Gary, Ind. It has also decided to install Koppers' new process for producing sulphate of ammonia direct from the gas.

Some slight modifications will be made on the Gary ovens compared to those erected at Joliet. To effect a shortening of the ascension pipes the gas will be taken off from one end of the oven. The doors are to be made in the shape of plugs, which will mean a simplification of the brickwork on the end of the ovens. Furthermore, only one charging larry will be necessary at the new plant, against two as at Joliet.

There will also be an improvement in the system of coke quenching. Instead of having the inclined coke bench, the coke will be pushed in a coke-quenching car. The benches will be arranged in 8 batteries of 70 ovens. The size of each oven is 37 feet between doors, 17 inches at pusher end, 21 inches at quenching end, and 9 feet 10½ inches to top of arch. The charge of coal for each oven will be about 13 tons, or a total charge from the complete 8 batteries of about 8,000 tons per day, which will yield 10½ tons of coke for each oven, or about 6,500 tons a day. It is claimed that about 50,000,000 cubic feet of surplus gas will be available, and that the quality of this surplus gas, indicated by heat units, will be not less than 500 B.T.U. per cubic foot. From this it will be seen that the surplus gas recovered from the ovens is equal to the output of a very large gas well of natural sort, and will be used as such at Gary. The heat value of the surplus gas is equal to more than 1,000 tons of good quality coal, which equivalent is obtained by means of gas from these ovens. The yield of sulphate of ammonia will be about 80 tons per day, of a claimed quality superior to that produced in the old system.

It is proposed to build and put in operation one battery at a time. It is thought that the first battery will be put in working operation about July 1st, 1910, and that the completed 8 batteries will be ready for operation 2 years hence.

The Expansion of Concrete Made with Coke Breeze.

Owing to the number of failures of roof and floor slabs made of coke breeze concrete which were called to his attention, Mr. D. B. Butler recently undertook a series of experiments to determine the expansion of such concrete, since an examination of the failed structures indicated that such action was responsible for the failures. His conclusions, which were presented in a paper before a recent meeting of the Society of Architects, England, contained these main points:

In nearly all samples of so-called breeze concrete, examined by Mr. Butler, a very considerable quantity of material other than pure coke was noticeable in the aggregate, such as clinkers, stones, shale and ashes, together with, in some instances, a noticeable amount of coal. Whatever may be the disadvantages of other extraneous material found in breeze, coal is not, in Mr. Butler's opinion, a desirable constituent for concrete; in the first place, on account of its smooth shiny surface, the adherence of the cement would be extremely poor; in the second place, it is worse than useless as a fireproof material, on account of its tendency to decompose on heating. The question arose, however, whether, apart from being undesirable for the reasons aforesaid, either coke breeze or coal was in any way dangerous as being likely to cause expansion of the concrete.

The first experiment was of a somewhat rough-and-ready nature, and was made with coal. An ordinary bituminous house coal was crushed and sifted to about the fineness of standard sand; with this coal a 3 to 1 mortar was made, and two small 2-ounce glass bottles filled with the mixture; one bottle was filled quite full, and the other was filled to within a ¼ inch of the top and sealed down with a paste of neat cement, the object of the sealing being to ascertain whether the imprisonment of any hydrocarbons set free from the coal would have any bursting effect. For comparative purposes similar bottles were also filled with a paste of neat cement and 3 to 1 mortar of standard sand.

The whole of the bottles eventually cracked, with the exception of one filled with standard sand-cement mortar. But while those entirely filled with the coal mortar generally cracked within 2 or 3

days, and with a very few exceptions continued to expand until the bottles burst away into several pieces, those filled with the neat cement and the sand mortar frequently did not develop any cracks whatever till several months, and it was the exception rather than the rule for them to continue expanding sufficiently to burst the bottle.

Both the neat cement and sand-cement mortar bottles remain perfectly sound after 11 months, and then only develop very minute cracks, whereas the coal mortar bottle was cracked in 12 days and burst right off in 42 days. This suggests that the cause of the cracking after such protracted periods might be due to unequal expansion of the glass and the mortars at varying temperatures.

The subsequent experiments were made with rectangular bars 100 mm long and 22 mm square in cross-section, the expansion and contraction of which were accurately measured in the Bauschinger micrometer caliper apparatus. By the use of this a minute variation of 0.005 mm, or 0.005 per cent. in the length of the prism may be detected.

Eight bars or prisms were made with satisfactory cement, four being made with neat cement and four with 3 to 1 standard sand-cement mortar. Two of each series were kept entirely in air and two placed in water after 24 hours, and kept therein during 3 months. The test pieces numbered 300 and involved 5,000 measurements.

A noticeable feature of the experiments is that many of the specimens which show very marked expansion when placed under water as soon as set expand very much less when left entirely in air. It therefore seemed a point worth determining as to whether exposure to damp or moisture would in any way effect these air-set specimens at the end of the 3 months' tests, after they had become thoroughly seasoned. One of the duplicate air bars from each series was therefore placed under water, the time elapsing between the date of moulding and placing under water ranging from 91 to 292 days. Immersion had practically no effect upon those specimens which had previously shown no expansion when kept under water, but it caused almost immediate expansion of a very serious nature with those fractions of breeze which had previously developed expansion when placed under water in the first instance. This clearly shows that the expansive agent, whatever it may be, is more or less dormant in the dry air set block, and only requires to become damped to constitute a serious element of danger.

Taken as a whole, the experiments as far as they go seem to point to the fact that as regards subsequent expansion there is not much danger to be apprehended from good clean coke or clinkers, or even anthracite coal, but that some kinds of ashes and furnace refuse are highly dangerous, while any considerable quantity of bituminous coal is absolutely fatal. One noticeable feature of the experiments, however, was, that most of the coke breeze mortars had a tendency more or less seriously to attack the iron moulds, causing them to rust during the short space of 24 hours between the moulding of the specimens and their removal from the moulds. Mr. Butler is unaware if such results have been found to any appreciable extent in actual practice, but samples of breeze concrete sent him for examination a short time ago showed distinct marks of considerable rusting having taken place where the concrete had been in contact with the rolled joists.

The German Association of Gas and Water Works Men.

Programme of the Annual General Meeting.—The annual general meeting of the Association was held from the 21st to the 25th insts., at Frankfort-on-the-Maine. The provisional programme of the technical proceedings, to which the three days—the 22d to the 24th inst.—were devoted, was restricted to technical communications relating to gas supply. The chair was held by Mr. E. Körting, General Manager of the Imperial Continental Gas Association's works at Berlin, who delivered a Presidential address inaugurating the meeting. The following papers were to be read:

"A Historical Retrospect," by Mr. E. Körting, of Berlin.

"A Review of the Position of the Water and Gas Supplies of Frankfort," by Herr Kölle, of Frankfort.

"The Storage of Coal," by Herr H. Prenger, of Cologne.

"Quality of Gas in Relation to Requirements," by Dr. H. Bunte, of Carlsruhe.

"Gas Supply to Distant Places, and the Coupling-up of Several Places in a Large Area of Supply," by Herr Kuckuk, of Heidelberg.

On June 23, these papers dealing with water supply, and the reports of some of the Technical Committees appointed by the Association, were presented:

"The Development of Water Supply in the Last Fifty Years," by Herr F. Reese, Manager of the Dortmund Water Works.

"The Origin of Underground Water, with Special Reference to the Hessian Plain," by Dr. Steuer, of Darmstadt.

"Removing the Acidity of the Undergrounnd Water of the Frankfort District," by Herr Scheelhaase, of Frankfort.

The Report of the Committee on the Working of Water Works, presented by the Chairman of the Committee, Herr F. Reese, of Dortmund.

The Report of the Electrolysis Committee, and the Report of the Standards Committee, both of which were presented by Mr. W. H. Lindley, the Chairman.

Friday was devoted to the presentation of the reports of the remaining Technical Committees, to private business, including the election of officers for the ensuing year, and to the reading of the two following papers dealing with gas supply:

"The Development of Gas Engines," by Herr J. Körting, of Düsseldorf.

"Advances in Inverted and High Power Incandescent Gas Lighting," by Herr Lebeis, of the Welsbach Company, of Berlin.

The reports of Committees will be presented by their Chairman as follows:

On the Constructional and Experimental Gas Works of the Association, by Dr. K. Bunte, Jr., of Carlsruhe.

On Photometry, by Dr. Leybold, of Hamburg.

On Heating, by Dr. E. Schilling, of Munich.

On Technical Training, by Dr. W. von Oechelhaeuser, of Dessau.

On Gas Meters, by Herr C. Kohn, of Frankfort.

The arrangements for the meeting were in the able hands of a local committee, of which Herr C. Kahn, of Frankfort, acted as Secretary. The Information Bureau was established in the offices of the Imperial Continental Gas Association in the Rosmarkt; and the technical meetings took place in the hall at the Zoological Gardens. There was to have been a reception by the Chief Magistrate of the City on the evening of Monday, the 21st inst., and for the afternoon of the following day a number of visits to works in the town were arranged, including an inspection of the vertical retort settings at the Solmsstrasse works of the Imperial Continental Gas Association; the works of the Frankfort Gas Company in the Gutleutstrasse; a new Municipal Gas Works at Offenbach-on-the-Maine, where there is an installation of vertical retorts, and the new water works of Frankfort at Hattersheim. For the evening of the Tuesday, arrangements were made to see performances at two of the theaters. For the afternoon of Wednesday, the 23d inst., visits to various works and exhibitions were arranged; and in the evening there was to be an assembly and concert in the Palm Garden. On the Thursday evening, a banquet and concert in the Zoological Gardens was on the cards; and on Friday, the 25th inst., an excursion was to be made to Saalburg and Homburg.

Unusual importance attaches to this year's meeting, because it is coincident with the celebration of the Jubilee of the Association.

A Failing Among Competent Workmen.

"F. A. W.," in a communication to the *Metal Worker*, on the subject named in the heading, remarks: Ability to do a piece of work in a first class manner is not the only qualification by which an employer judges his men. A case which very clearly brings out this point recently came to notice with a contractor who employs several first-class plumbers. He has two mechanics equally expert, and as they are both sober, industrious and in every way trustworthy, it can readily be seen they are naturally very valuable men. Their employer depends upon them to take charge of work and direct others when he is not on the job himself, which is the greater part of the time, as large contracts are taken at long distances from the shop. In speaking of the value of these two men the employer stated that there was no choice between them as far as the quality of their work was concerned; they worked equally hard, and one was as particular as the other to please customers and look after the employer's inter-

ests. But he pointed out a difference between these two men which sometimes causes considerable annoyance with one of them.

It seems that one of these mechanics when taking charge of a job, no matter how large or how far from home, asks for nothing but the materials and labor necessary to do the work, depending entirely upon himself to work out any problem that comes up during the progress of the work. If he runs short of any material he orders it from the nearest jobbing house without communicating with the home office. In a word, he takes hold of the job and puts it through without looking for assistance from any quarter. The other man, while equally capable, lacks the self-confidence necessary to do this. When in charge of a job some distance from home he is in constant communication with his employer. He shrinks from taking any responsibility whatever, and asks advice about things that he is perfectly competent to decide for himself. This lack of self-confidence is not only a source of annoyance, but it is also expensive. It frequently causes delay, and without good reasons, as the man has all the technical knowledge necessary to decide any question that comes up. In fact, he frequently asks for instructions about how to do a certain thing, and, when told, he will suggest a better way, which he has thought out himself, but has hesitated to adopt without being authorized to do so.

The fact that some men bear responsibility better than others is, no doubt, due in great part to temperament, but training will help the man who is not well fitted by nature to go it alone. If he forms the the habit of depending upon himself he will find that it will increase his earning capacity. Every employer in the plumbing business finds enough detail to take his time without giving up any of it to some man who really needs no assistance. It would seem that the younger members of the trade might learn something from this description of the difference between two skilled workmen. Which is worth the more money to an employer and the more likely to succeed in business for himself?

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, June 10th, 1909.

Annual Meeting of Institution of Gas Engineers—A Slot Meter Question—The International Congress of Applied Chemistry.

The usual notices for the annual meeting of the Institution of Gas Engineers, to be held in London on the 15th, 16th and 17th insts., under the Presidency of Mr. Thomas Glover, of Norwich, are now in the hands of the members, and the question of the day is how to arrange for attendance. With the increasing details that press upon the attention of gas managers, it is not so easy to manage for an absence from home, say for the inside of a week, as in the earlier days of the Institution, when the summer season represented a 3 months' slack time. Now the summer months are as busy as any other period of the year. So some who have in the past been regular attendants throughout the whole sitting, will be compelled to content themselves with a look in on one day, and some will not be able to go at all. It is only lately that an attendance list has been kept, but probably the percentage attendance of members is appreciably less than in the old days, not on account of diminished interest in the affairs of the Institution, but solely for the reason just indicated.

Another feature is the decline of the "paper." This year there are only six papers submitted for reading, and deducting one of a special character, there are only five contributed by the members. As with the attendance, the percentage of paper reading members tends to decrease. The increased occupation of members trenches upon their leisure time and facilities for preparing papers. The principal district associations secure many subjects. A few go to general engineering or chemical societies. The enterprising technical journalist gets wind of any new departure, and manages to work up an article, including the principal novelties. This may account for the fact that while our technical literature, like the stout old lady at Sam Wellers tea meeting, is visibly increasing in size, gas engineers do not seem to have so many topics to introduce for public discussion, although they seem to suffer no lack of matter for private informal debate. Going back 10 years, there were nine papers submitted by members at the 1899 meeting, and in many other years the number of papers has exceeded ten. Three of the five papers refer to carbonizing, and two to financial matters. The Gas Heating Research Committee submit a report, and the holder of the gas engineering scholarship at the Leeds University will describe his experiments on the efficiency of gas in relation to incandescent light. The important subjects of purification, distribution and the commercial department, are entirely unrepresented, and the programme, as a whole, does not offer much attraction to small gas managers.

But if the list of papers grows smaller in numbers and narrower in scope, the report of the Council increases both as to length and detail. The report for 1899 occupied not quite 2 pages. This year it extends to 20. The membership has increased from 807 to 825, and after a very brief "Obituary" record, the Council described the proceedings in connection with the Livesey memorial fund for the endowment of a Professorship in Gas Engineering and Fuel, on account of which some £9,800 out of the £10,000 required has been raised. It is remarkable that the list of subscribers only number 542, including 194 members of the Institution, 154 gas companies, and 19 municipal owners. It is suggested that the balance should be raised before the 15th, so that the President should be able to announce at the meeting that the sum required was all received. As there appears to be some 630 members, 337 gas companies, and 253 municipal owners, who have not yet subscribed, 1,220 in all, it is not a very big order to ask for £200, so it is to be hoped that the suggestion will be acted upon. The popularity of Sir Geo. Livesey is not adequately represented by the small proportion of subscribers to the whole industry. Explanation must be looked for in other directions. There is a feeling that the Scholarship will be more useful to the immediate neighborhood of Leeds than to districts remote from it, that a University course is beyond the reach of the sons of the rank and file of the members, and that as the gas industry generally will benefit by the movement, rather than individual employees, the proprietors of gas undertakings should take the greater share. Gas engineers are not philanthropists, but business men with a living to earn, and they cannot afford to ignore the fact that with all the efforts they have made to improve themselves and the industry at large, by widening their source of knowledge and of technical training, and notwithstanding that the gas works manager of to-day must be of higher caliber in all respects, technical, commercial, financial, than his predecessor, the salaries offered tend to decrease, and are substantially less now than they were over 40 years ago, when a president of the British Association of Gas Managers pointedly referred to the inadequate remuneration then offered to the responsible heads of gas undertakings. After summarizing the proceedings at the 1908 meeting, it is mentioned that no less than seven of the district associations are now affiliated to the Institution. A great deal of work is being done in connection with the Special Purposes Fund. There is a Committee on Carbonization who are not prepared with a report at present. A powerful committee have the subject of gas heating in hand, and some account of their labors will be presented at the meeting. There are reports from conferences on refractory materials, unification of gas pipe screw threads, standard clauses in contracts for the supply or construction of gas plant and apparatus, the international unit of light, and photometric units. Altogether the report affords plenty of matter to occupy the attention of members during the leisure afforded by the journey to London.

The fact that the gathering together of gas engineers from all parts of the country for a few days affords opportunity for useful work outside the official programme, is instanced by the fact that arrangements have been made for a joint conference of the District Association Commercial Sections, to which not only the members of such sections are invited, but also all engineers who may be interested in the work. It is also suggested that each engineer should bring with him the chairman or a member of his board of directors, or other managing financial committee. I have referred on previous occasions to the growth of the commercial section, which in the course of a very few years has come to be recognized as a necessary adjunct to every district association. While each section is essentially local in its operations, there are many points in common that admit of general discussion. Amongst other matters on the agenda are the questions of publishing reports, of tar quotations and of sulphate sales. There will be no difficulty in profitably occupying the time at disposal, and we may hope that the attendance will be large and in every way representative.

The usual social attractions have been provided. There will be a conversazione and a day excursion to Norwich. In connection with the latter it should be mentioned that not only the Norwich Gas Company but the Norwich corporation officers are sharing in the days proceedings. The Gas Company entertain the visitors at luncheon, and the corporation offer an afternoon's enjoyment in the form of a river trip. This is a compliment to the Institution and also a substantial proof that the President for the year is as highly esteemed in

his native city, by his neighbors, as he is by his professional brethren. I have previously raised the question as to whether the continually increasing pleasure attractions of the Metropolis do not interfere with its suitability as a place of meeting. At one time there was nothing to do during the day but to attend the meetings. There were, of course, theaters and other evening entertainments, but these were well clear of the hours of sitting. But now there is the White City and all sorts of recreations that are on from 10 in the morning to 12 at night. With the ample provision for recreation above instanced, we may hope that the members will not allow the natural desire for recreation to prevent them from doing full time at the meetings.

A somewhat important question in connection with slot meter supply was raised at a London police court a few days since, the point in dispute being the ownership of the money in the till or cash box of a slot meter. The gas company summoned a gas consumer for stealing 2s. from the slot meter, and admitted that previous deficiencies had been arranged. It appeared that the defendant habitually took coins from the cash box, and also used tin disks as a substitute for coins, but had not paid any deficiency as shown by the index of the meter when the collector called. But the company decided that this method could not continue, and on the last clearance refused payment of the deficit and commenced proceedings. The point in dispute is where the act of payment comes in. Is it the insertion of the coin, or the removal of the same by the collector. In the first case it follows that the contents of the till are the property of the gas company. In the second they are the property of the consumer until the collector or other representative of the company takes possession of them. The gas company very naturally take the first view, which is in fact the essence of the slot meter system. The usual form of agreement is "that the consumer shall pay for the gas used *by inserting coins in the slot*," not by paying them to the collector. And the commonsense view of the matter is that the cash box is a receptacle belonging to the gas company and that the contents are as much their property as if they were paid to a proper official. But the defendant contended for the second view and in effect that he could do as he liked with the contents of the till provided he paid the full sum to the collector. The magistrate was with him to some extent, as he thought that it was a question of intention and that a jury would have to decide whether the object was to defraud, or otherwise. As the case was adjourned, it will not be proper to express an opinion. But it is to be hoped that it will be the means of bringing out a definite pronouncement, as the matter is one of public importance. If decided against the gas company it opens up some awkward questions affecting the use of slot machines generally, seeing that in all cases the rule is for the collector to come round at regular periods, which in practice are based upon the time required to make up a sum that is worth clearing. Some machines may be cleared once a day, others once in 3 months.

The Seventh International Congress of Applied Chemistry was held in London last week, the proceedings being opened by the Prince of Wales, and as it included some 20 sections and sub-sections, a considerable amount of reading and discussion took place. Much of it, of course, was outside the limits of our industry, but there were also several items that bear directly or indirectly upon it. Prof. Féry, of Paris, gave a description of a recording thermo-electric calorimeter, intended to give a continuous record of the gas made in a gas works or producing plant. The value of such an instrument in connection with investigations as to the causes which influence the calorific value of gases is obvious. Mr. E. Lloyd, of Manchester, read a paper on the carbonization of coal in by-product ovens. A new refractory material was introduced under the title of fused silica ware, consisting of practically pure silica, which was claimed to be acid proof and capable of resisting sudden and extreme changes of temperature without cracking. An inner cylinder for inverted gas burners was to be seen amongst specimens of crucibles, tubes, etc. It was stated that tubes up to 80 feet long and castings 70 pounds in weight had been made. Mr. John B. C. Kershaw, of Liverpool, advocated the fixing of coal contracts on a calorific value basis, and described the progress already made towards the adoption of this method. It was decided that the general definition for the yield of volatile matters in fuels should be the percentage as found by subtracting from 100 the yield of coke obtained by the method of the American Committee on Coal Analyses, from 1 grain of fuel in a bright platinum crucible ("Jour. Am. Chem. Soc." 21, p. 1122), and the yield must be calculated on the pure combustible matter. Prof. Boverton Redwood delivered a lecture on "Liquid Fuel." All these matters may be read by the scientifically inclined gas engineer with pleasure and profit.

Items of Interest
FROM VARIOUS LOCALITIES.

"L. B.," writing from Minneapolis, Minn., under date of the 15th inst., says: "It is generally thought here that an understanding has been reached between the proprietors of the Minneapolis Gas Light Company and the local authorities, through the operation of which the latter will make no attempt to take over the property of the former at a valuation, as may be done next year through a condition in the operating charter of the Company. The proposition submitted by the Company is essentially as follows: First, a reduction in the selling rate of 10 cents per 1,000 cubic feet—that is, 90 cents to ordinary users and 80 cents to the city; 2, an agreement giving the city power to order main extensions; 3, to submit to arbitration of the price of gas each year, such right to begin 3 years after the expiration of the right of the city to purchase in 1910; 4, to allow the city control of the operation of the Company, the city to have the right to examine the Company's books in order to at any time determine its earnings."

We understand that the Town Council, of East Stroudsburg, Pa., has granted a franchise to the promoters of the Citizens Gas Company, under which the latter may distribute gas in East Stroudsburg for the period of 25 years. It is agreed that the Company may make its selling rates for the first 5 years of operation, provided the maximum of $1.25 per 1,000 is agreed upon.

It looks that the Indianapolis Aero Club is satisfied that the Indianapolis Gas Company can do things in the "lifting line" without hitching or quibbling. At least such is our belief, having perused the following letter from Mr. Carl G. Fischer, President of the Aero Club, of Indiana, to Mr. Carl Graf, Manager of the Indianapolis Gas Company, written under date of the 10th inst.:

"I wish to thank you on behalf of the Aero Club of America, Aero Club of Indiana and the Indianapolis Motor Speedway, for the assistance you have given us during the past several weeks in making it possible for us to have the greatest balloon meet ever held in the United States. I wish further to congratulate you on the splendid gas which was delivered to us, and which was better than any other gas that has been delivered in any balloon inflated with artificial gas in this country. The fact that the Indiana remained afloat 49 hours and 25 minutes, which was a longer time than any other balloon entered in the contest, and which breaks all American records, speaks well for the quality of gas you delivered. Without the assistance given by your Company, it would not have been possible for us to have conducted a successful meet."

"J. G. B.," writing from Chicago under date of the 17th inst., says: "You New Yorkers must be a queer sort, to say the least; and we in the West certainly take off our hats to you (in the commercial engineering division at least), since none of our drummers—and we have many good ones—ever had the nerve to seek to increase our output by tackling a churchman, and a Catholic churchman at that. What leads me to this outburst is this dispatch from your city, bearing date of the 14th inst., and published in our *Inter-Ocean* of the following day. The dispatch is this: 'A novel method to pay off its debt of $200,000 has been adopted by the Roman Catholic Church of St. Nicholas, on East 2d street. An ornate brass chandelier has been constructed, so that 100 gas jets extend in fanciful groups of 10 on each side of the altar. Arrangements have been made whereby any person paying $1,000 to the church may have one of these lights lit for him at every church service forever; and he may have as many lights as he desires at $1,000 each. When a light is purchased the owner's name is inscribed below it on a brass plate, and thereafter it is to be burned at every church service. Thirty of the lights have been purchased and paid for, and were burned yesterday for the first time at the dedication of the chandelier. Eighteen other lights have been engaged by members of the congregation.'"

Mr. Edward A. Barnett, recently appointed to take charge of the new business division of the Citizens Gas Company, of Kankakee, Ills., is making good. At any rate, Manager Newberry seems satisfied that this is so.

Mr. H. P. Dennis, Vice-President of the Industrial Instrument Company, writing from Foxboro, Mass., under date of the 19th inst., says: "We have recently had binders made for our 8 by 11 'Engineering Bulletin,' and we would like as many of our engineering

friends as possible to know that these binders will be sent to them on application. Furthermore our bulletin ideas for disseminating information about the instruments of our manufacture may be more or less interesting." Secretary Dennis's address is care "The Industrial Instrument Company, Foxboro, Mass."

AT the annual meeting of the Stratford (Conn.) Gas Company these officers were chosen: President, N. W. Bishop; Secretary and Treasurer, G. W. Roberts. It is proposed to pipe the gas from Bridgeport and then distribute the same through a series of mains controlled by the Stratford Company. In other words, the wholesale factor in the arrangement will be the Bridgeport Gas Company.

AT the annual meeting of the Exeter (N. H.) Gas Light Company the officers elected were: Directors, A. P. Browne, Odiorne Swain, Edward Hatch, Wm. Burlingame, A. F. Cooper; Treasurer, A. P. Browne; Clerk, Arthur F. Cooper.

"B. W.," writing from Louisville, Ky., under date of the 16th inst., says: "I regret to inform you that Mr. John Struss, Gas Inspector for this city, was thrown from his buggy, at noon of yesterday, and severely injured. His horse took fright at a passing trolley. It is likely he will recover."

THE Indiana Lighting Company has placed an order with the Western Gas Construction Company, through the completion of which the generating apparatus of the Fort Wayne gas works will be increased 100 per cent. It is now up to putting out 1,250,000 cubic feet in 24 hours.

THE proprietors of the Hartford (Conn.) City Gas Light Company, under date of the 15th inst., authorized General Manager R. E. Slade to make the following announcement: "The attention of gas consumers is called to the following schedule of reduced prices for gas which will become effective at once, and will apply to bills to be rendered July 1, 1909, and will be based on monthly use per meter.

	Billed at.	Net Price.
Up to 10,000 cubic feet..	$1.00	$0.90
10,100 cubic feet to 50,000 cubic feet	.95	.85
50,100 cubic feet to 100,000 cubic feet....	.90	.80
100,100 cubic feet or more.....	.85	.75

"The cash discount making the net price is 10 cents per 1,000 cubic feet on all bills paid before the 15th of the month following that in which the gas is used, provided all previous indebtedness is paid.

"A minimum charge of $6 per meter per calendar year will be made in all cases where the amount of gas used per meter per calendar year does not equal this sum. The difference between the amount used and the minimum charge will be billed at the close of each year."

THE residents of Crown Point, Ind., are considering the advisability of granting certain capitalists the right to there operate a gas works.

AT the last meeting of the Directors of the Fort Atkinson (Wis.) Gas Company, Mr. M. D. Foster, of Jefferson, Wis., was elected President, to succeed Mr. N. D. M. Bradt, resigned. Mr. F. N. Pettigrew, of Fox Lake, was appointed General Manager. This is an acetylene scheme, of the central station sort.

MR. W. A. CUNNINGHAM, of Anamosa, Ia., acting in conjunction with F. G. Ray, of Vinton, Ia., have organized the Peoples Gas Company, of Anamosa, for the purpose of constructing and operating a gas works in the place named. It is capitalized in $35,000. Mr. Cunningham is President of the concern and his post office address is Anamosa, Ia.

CAPT. L. D. SPRAGLE, who resigned last fall the post of Superintendent to the Fulton County (N. Y.) Gas and Electric Company, has engaged with the Niagara Silk Mill, the plant of which is in Tonawanda, N. Y. We wish him the best of good luck.

A CORRESPONDENT in Peoria, writing under date of the 17th inst., incloses the following: "The Peoria Gas and Electric Company is now in a $10,000,000 combination with the Evansville (Ind.) Light Company, the Springfield Utilities Company and the Rockford and Inter-Urban Railway. News of this merger has been printed heretofore, and the main claim for it all is that the combination will give the stockholders better returns all round for their investment. The larger share of the capital behind the properties is controlled by Eastern capitalists. The Peoria, Springfield and Evansville properties have been under the one management for some time, but the Rockford holdings are of a more recent addition. With the new order of things General Manager Emil G. Schmidt, of the Springfield Utilities Company, will become Vice-President and General Manager of the district. It is the intention of the new holding Company to have a capital of $825,000 preferred stock and $6,000,000 common stock. The bonds will be 5 per cent. collateral trust and the 6 per cent. cumulative. The combination will be effective on July 1st."

CONTRACTORS are advised that Messrs. George Bowen, M. Hinshaw, J. F. Reale and others, have formed the Olney Gas Company, to construct and operate a gas plant in the town of Olney, Ills. The concern is capitalized in $50,000.

THE plants and franchises (in fact, all its belongings) of the Ashland (O.) Gas and Electric Light Company have been purchased by the American Gas and Electric Company, of which concern Mr. S. N. Blake of Providence, N. J., is Manager. The Ashland properties will hereafter be managed by his brother, Mr. S. N. Blake. We understand from Mr. Blake that the new owners will expend something like $50,000 in improving the plants at Ashland, the greater amount of which will be put into the electric end of the enterprise.

A CORRESPONDENT in Minneapolis, Minn., writing under date of the 21st inst., says that Mr. F. W. Little has purchased a controlling interest in the bonds and stock of the Sault Ste. Marie (Mich.) Gas and Electric Company, and he will expend not less than $25,000 on improvements and extensions to the system this year. Mr. Little is not at all a novice in the artificial lighting business, having been at one time Vice-President of the Peoria (Ills.) Gas and Electric Company and President of the Springfield (Mo.) Gas and Electric Company. Associated with Mr. Little is Mr. James Trimble as Vice-President. Mr. Trimble was President of the Manistee (Mich.) Railway, Gas and Electric Company.

THE Peoples Gas Light and Coke Company, of Chicago, Ills., will at once proceed with the construction of the storage holders that it was proposed to construct a year or more ago at the junction of Erie avenue and 96th street. The contract for the foundations has been awarded to R. S. Blome & Co.

MR. WILLIAM MOORE has resigned from the staff of the Ocala (Fla.) Gas Company in order to accept a more responsible one with the Tampa (Fla.) Gas Company.

SUPERINTENDENT RATHELL of the Waco (Tex.) Gas Company, has been authorized to add 6 miles or more of pipe to its present distributing system.

THE San Francisco (Cal.) Gas and Electric Company recently submitted the following bids for the public lighting thereof: Gas lamps, all night and every night, .0654 cent; for each arc light, all night basis, 20 cents per lamp per night; each arc, burning until midnight 13.80 per lamp per night, for public buildings, 60 cents per 1,000 cubic feet; for each arch electric light 20 cents per lamp per night.

MR. A. H. CALKINS has been appointed Superintendent of the Galveston (Tex.) Gas Company, vice Mr. John Gimper, resigned.

MR. DANVILLE DECKER, the clever and up-to-date Manager of the Ogden (Utah) Gas Company, will put down over 5 miles of mains in heretofore unpiped sections of the named place. Miss Van Cott this month concluded a most successful series of demonstration lectures on cooking by gas, and whose cooking class at Weber Academy has attracted so much attention, evidenty determined the Directors of the High School to itstall gas as the fuel for cooking purposes in the domestic science department thereof.

A CORRESPONDENT in Chicago, writing under date of the 15th inst., says: "Last week a notable criminal trial was brought off in the Criminal Building, in the case of the Peoples Gas Light and Coke Company versus Adolph Klein. In 1905 he was indicted for stealing a small quantity of gas, and his first trial was not reached until September 16, 1908. The jury disagreed, as also did the second one (March 11, 1909). The third trial resulted in a verdict of guilty, and the Judge imposed a fine of $25, although the leading witness (an inspector for the Company), who had been watching the Klein premises for a long time, only succeeded in finding him tampering with the meter over a period that was a trifle less than 5 minutes.

J. A. ALMUTT and others have applied to the authorities of Sumter, S. C., for a franchise under which to operate a gas works. One condition that they ask is that the city shall impose no tax upon the property for the first 5 years in which it is in operation. Sumter has had an electric plant for some years.

MR. H. H. MCCONNELL, formerly in charge of the new business division of the Elmira (N. Y.) Water, Light and Railroad Company, is now in charge of the commercial department of the Colorado Springs (Col.) Gas and Electric Company.

IT is likely that the Springfield (Mass.) Gas Light Company will this season extend its distributing system to and through the section known as West Springfield.

THE rate paid by the Connecticut River Power Company for control in the Easthampton Gas Company was at the rate of 200 per cent.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance, Single copies, 10 cents.

The JOURNAL is the official organ of the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand anytime of Wednesday.

AGENTS:

New York—American News Company, 39 and 41 Chambers street.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime street, London.

MONDAY, JUNE 28, 1909.

The Market for Gas Securities.

There is quite a slump to record in respect of quotations for Consolidated gas, which opened to-day (Friday) at 139½ to 139¾. There is no valid reason for the break; to the contrary there is much reason for a sharp advance. Keep your mind on the coming accounting in the instance of the electric division of the Company's service. Brooklyn Union has crept up within a point of equality towards Consolidated. It is 138 to 140. Peoples, of Chicago, keeps fairly steady, within the range of 114 to 116. Washington (D. C.) is 350 to 352, and another sharp rise can be confidently looked for prior to August. Massachusetts common is 63 bid, and 90 is bid for the preferred.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 28.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	Capital	Par	Bid.	Asked.
Consolidated Gas Co.	$78,177,000	100	139¾	139¾
Central Union Gas Co.—				
1st 5's, due 1978, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101¼
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	37	42
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st o's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	138	140
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	94
Yonkers	999,850	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	1¼	1¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	60	60¼
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	98
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,662,750	100	90¼	91
Preferred	3,028,500	100	75¼	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,800,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	118
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	860,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,235,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	106	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 6's	200,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	38
Bonds, 1st 5's	3,832,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	—	100
Preferred	2,500,000	100	80	90
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910	100,000	25	60	60¼
Massachusetts Gas Companies, of Boston	25,000,000	100	63	63¼
Preferred	25,000,000	100	90	90¼
Montreal Gas Co., Canada	3,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	86	88
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	95,000,000	100	113¾	114
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
ochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	116	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 5's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	101
Washington (D. C.) Gas Co.	2,600,000	20	350	352
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	230	—

Advertisers' Index.

GAS ENGINEERS. Page

Bartlett-Hayward Co., Baltimore, Md. ... 1197
Cruse-Kemper Co., Philadelphia, Pa. ... 1184
Davis & Farnum Mfg. Co., Waltham, Mass. ... 1196
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
Evens & Howard Firebrick Co., St. Louis, Mo. ... 1182
Frank D. Moses, Trenton, N. J. ... 1178
Frederick J. Mayer, New York City ... 1177
Henry I. Lea, Chicago, Ills. ... 1196
H. M. Byllesby & Co., Chicago, Ills. ... 1196
Humphreys & Glasgow, New York City ... 1198
Improved Equipment Company, New York City ... 1178
Isbell-Porter Co., Newark, N. J. ... 1184
Kerr Murray Mfg. Co., Fort Wayne, Ind. ... 1197
Laclede-Christy Clay Products Co., St. Louis, Mo. ... 1192
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 1181
Quintard Iron Works, New York City ... 1185
The Gas Machinery Co., Cleveland, O. ... 1176
The United Gas Improvement Co., Philadelphia, Pa. ... 1191
Western Gas Construction Co., Fort Wayne, Ind. ... 1156
William A. Raehr, Chicago, Ills. ... 1174

GAS WORKS APPARATUS AND CONSTRUCTION.

Bartlett-Hayward Co., Baltimore, Md. ... 1197
Chamber Oven Co., Milwaukee, Wis. ... 1179
Connelly Iron Sponge & Governor Co., New York City. 1193
Continental Iron Works, Brooklyn, N. Y. ... 1194
Cruse-Kemper Co., Philadelphia, Pa. ... 1184
Davis & Farnum Mfg. Co., Waltham, Mass. ... 1196
Deily & Fowler Mfg. Co., Philadelphia, Pa. ... 1200
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
Evens & Howard Firebrick Co., St. Louis, Mo. ... 1182
Gas Engineering Co., Trenton, N. J. ... 1178
Humphreys & Glasgow, New York City ... 1196
Improved Equipment Company, New York City ... 1178
Isbell-Porter Co., New York City ... 1184
Kerr Murray Mfg. Co., Fort Wayne, Ind. ... 1197
Laclede-Christy Clay Products Co., St. Louis, Mo. ... 1192
Lloyd Construction Co., Detroit, Mich. ... 1186
Quintard Iron Works Co., New York City ... 1185
R. D. Wood & Co., Philadelphia, Pa. ... 1198
Riter-Conley Mfg. Co., Pittsburgh, Pa. ... 1183
Stacey Mfg. Co., Cincinnati, O. ... 1199
The Gas Machinery Co., Cleveland, O. ... 1176
The United Gas Improvement Co., Philadelphia, Pa. 1191
Western Gas Construction Co., Fort Wayne, Ind. ... 1156

PROCESSES.

Bartlett-Hayward Co., Baltimore, Md. ... 1197
Chamber Oven Co., Milwaukee, Wis. ... 1179
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
Humphreys & Glasgow, New York City ... 1196
Improved Equipment Company, New York City ... 1178
The Gas Machinery Co., Cleveland, O. ... 1176
The United Gas Improvement Co., Philadelphia, Pa. ... 1191
Western Gas Construction Co., Fort Wayne, Ind. ... 1156

SCRUBBERS AND CONDENSERS.

Bartlett-Hayward Co., Baltimore, Md. ... 1197
Continental Iron Works, Brooklyn, N. Y. ... 1194
Cruse-Kemper Co., Philadelphia, Pa. ... 1184
Davis & Farnum Mfg. Co., Waltham, Mass. ... 1196
Economical Gas Apparatus Construc. Co. Toronto, Ont. 1174
Evens & Howard Firebrick Co., St. Louis, Mo. ... 1182
Isbell-Porter Co., Newark, N. J. ... 1184
Kerr Murray Mfg. Co., Fort Wayne, Ind. ... 1194
Quintard Iron Works, New York City ... 1185
R. D. Wood & Co., Philadelphia, Pa. ... 1198
Riter-Conley Mfg. Co., Pittsburgh, Pa. ... 1183
Stacey Mfg. Co., Cincinnati, O. ... 1199
The Gas Machinery Co., Cleveland, O. ... 1176
The United Gas Improvement Co., Philadelphia, Pa. ... 1191
Western Gas Construction Co., Fort Wayne, Ind. ... 1156

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
R. D. Wood & Co., Philadelphia, Pa. ... 1198

TAR AND CARBONIC ACID EXTRACTOR.

Bartlett-Hayward Co., Baltimore, Md. ... 1197
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
Isbell-Porter Co., Newark, N. J. ... 1184
Kerr Murray Mfg. Co., Fort Wayne, Ind. ... 1197
Stacey Mfg. Co., Cincinnati, O. ... 1199
The Gas Machinery Co., Cleveland, O. ... 1176
The United Gas Improvement Co., Philadelphia, Pa. ... 1191
Western Gas Construction Co., Fort Wayne, Ind. ... 1156

AMMONIA CONCENTRATORS.

Bartlett-Hayward Co., Baltimore, Md. ... 1197
Michigan Ammonia Works, Detroit, Mich. ... 1174
The Gas Machinery Co., Cleveland, O. ... 1176
Western Gas Construction Co., Fort Wayne, Ind. ... 1156

GAS METERS.

American Meter Co., New York and Philadelphia.....1203
D. McDonald & Co., Albany, N. Y.....1201
Helme & McIlhenny, Philadelphia, Pa.....1203
John J. Griffin & Co., Philadelphia, Pa.....1204
Keystone Meter Co., Royersford, Pa.....1202
Maryland Meter and Mfg. Co., Baltimore, Md.....1202
Metric Metal Co., Erie, Pa.....1203
Nathaniel Tufts Meter Co., Boston, Mass.....1202
New York Improved Meter Co., New York City.....1202
Pittsburg Meter Co., East Pittsburg, Pa.....1186
Rotary Meter Co., New York City.....1175
Sprague Meter Co., Bridgeport, Conn.....1201
United States Meter Co., Brooklyn, N. Y.....1203

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia.....1203
D. McDonald & Co., Albany, N. Y.....1201
Helme & McIlhenny, Philadelphia, Pa.....1203
John J. Griffin & Co., Philadelphia, Pa.....1204
Keystone Meter Co., Royersford, Pa.....1202
Nathaniel Tufts Meter Co., Boston, Mass.....1202
New York Improved Meter Co. New York City.....1202
Pittsburg Meter Co., East Pittsburg, Pa.....1186
Sprague Meter Co., Bridgeport, Conn.....1201

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City.....1202

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa.....1186

GAS AND WATER PIPES.

Davis & Farnum Mfg. Co., Waltham, Mass.....1196
Donaldson Iron Co., Emaus, Pa.....1188
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
R. D. Wood & Co., Philadelphia, Pa.....1198

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 1184
Perkins Co., New York City.....1184
Westmoreland Gas Coal Co., Philadelphia, Pa.....1185

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., New York City.....1185

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y.....1185

GAS TAPPING MACHINES.

George Light, Dayton, O.....1185
H. Mueller Manufacturing Co., Decatur, Ills.....1179

CANNEL COALS.

Perkins & Co., New York City.....1194

STOKING MACHINERY.

G. A. Bronder, New York City.....1193
Laclede-Christy Clay Products Co., St. Louis, Mo.....1192
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.....1181

CONVEYORS—ALL KINDS.

Bartlett-Hayward Co., Baltimore, Md.....1197
Cruse-Kemper Co., Philadelphia, Pa.....1184
C. W. Hunt Company, New York City.....1196
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
G. A. Bronder, New York City.....1183
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1197
The Gas Machinery Co., Cleveland, O.....1176
Western Gas Construction Co., Fort Wayne, Ind.....1156

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass.....1196
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1197
Stacey Mfg. Co., Cincinnati, O.....1199

GAS ENRICHERS.

Standard Oil Co., New York City.....1147

COKE CRUSHERS.

Bartlett-Hayward Co., Baltimore, Md.....1197
C. M. Keller, Columbus, Ind.....1195

GAS METER CONNECTIONS.

H. Mueller Manufacturing Co., Decatur, Ills.....1179

GAS COCKS.

H. Mueller Manufacturing Co., Decatur, Ills.....1179

GAS GAUGES.

The Bristol Co., Waterbury, Conn.....1188

GAS GOVERNORS.

Chaplin-Fulton Mfg. Co., Pittsburg, Pa.....1198
Connelly Iron Sponge & Governor Co., New York City. 1193
Evens & Howard Firebrick Co., St. Louis, Mo.....1192
Isbell-Porter Co., Newark, N. J.....1184
Pittsburg Meter Co., East Pittsburg, Pa.....1186
R. D. Wood & Co., Philadelphia, Pa.....1198
Reynolds Gas Regulator Co., Anderson, Ind.....1193

CEMENTS.

C. L. Gerould, New Castle, Pa.....1192
Laclede-Christy Clay Products Co., St. Louis, Mo.....1192
Strassburger Bros., Chicago, Ills.....1192

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md...1192
Chamber Oven Co., Milwaukee, Wis.....1159
Didier-March Co., New York City.....1177
Evens & Howard Firebrick Co., St. Louis, Mo.....1192
Gas Bench Construction Co., St. Louis, Mo.....1185
Henry Maurer & Son, New York City.....1185
Improved Equipment Company, New York City.....1178
James Gardner, Jr., Co., Bolivar, Pa.....1194
J. H. Gautier & Co., Jersey City, N. J.....1192
Laclede-Christy Clay Products Co., St. Louis, Mo.....1192
Missouri Firebrick Co., St. Louis, Mo.....1192
Parker-Russell Mining and Mfg Co., St. Louis, Mo....1181

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md...1192
Didier-March Co., New York City.....1177
Gas Bench Construction Co., St. Louis, Mo.....1185
Improved Equipment Company, New York City.....1178
Laclede-Christy Clay Products Co., St. Louis, Mo.....1192
Parker-Russell Mining and Mfg. Co., St. Louis, Mo....1181

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 1193
Didier-March Co., New York City.....1177
Gas Bench Construction Co., St. Louis, Mo.....1185
Improved Equipment Company, New York City.....1178
Laclede-Christy Clay Products Co., St. Louis, Mo.....1192
Parker-Russell Mining and Mfg. Co., St. Louis, Mo....1181

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md..1192
Bartlett, Hayward & Co., Baltimore, Md.....1197
Didier-March Co., New York City.....1177
Gas Bench Construction Co., St. Louis, Mo.....1185
Improved Equipment Company, New York City.....1178
J. H. Gautier & Co., Jersey City, N. J.....1192
Laclede Christy Clay Products Co., St. Louis, Mo.....1192
Missouri Firebrick Co., St. Louis, Mo.....1192
Parker-Russell Mining and Mfg. Co., St. Louis, Mo....1181

SELF-SEALING MOUTHPIECE DOORS.

Bartlett-Hayward Co., Baltimore, Md.....1197
Continental Iron Works, Brooklyn, N. Y.....1198
Davis & Farnum Mfg. Co., Waltham, Mass.....1196
Isbell-Porter Co., Newark, N. J.....1184
Improved Equipment Company, New York City.....1178
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1197
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.....1181
Quintard Iron Works, New York City.....1185
R. D. Wood & Co., Philadelphia, Pa.....1198
Stacey Mfg. Co., Cincinnati, O.....1199
The Gas Machinery Co., Cleveland, O.....1176
Western Gas Construction Co., Fort Wayne, Ind.....1156

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich.....1180
Welsbach Company, Gloucester, N. J.....1190

BURNERS.

Wm. M. Crane Co., New York City.....1180

STREET LAMPS.

Thos. T. W. Miner, New York City.....1186
Welsbach Street Lighting Co., New York and Phila..1190

GAS BLAST FURNACES.

American Gas Furnace Co., New York City.....1174

PURIFIERS.

Bartlett-Hayward & Co., Baltimore, Md.....1197
Connelly Iron Sponge & Governor Co., New York City. 1193
Cruse-Kemper Co., Philadelphia, Pa.....1184
Davis & Farnum Mfg. Co.. Waltham, Mass.....1196
Isbell-Porter Co., Newark, N. J.....1184
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1197
Quintard Iron Works, New York City.....1185
R. D. Wood & Co., Philadelphia, Pa.....1198
Stacey Mfg. Co., Cincinnati, O.....1199
The United Gas Improvement Co., Philadelphia, Pa. 1191
Western Gas Construction Co., Fort Wayne, Ind.....1156

VALVES.

Bartlett-Hayward & Co., Baltimore, Md.....1197
Continental Iron Works, Brookln, N. Y.....1194
Davis & Farnum Mfg. Co., Waltham, Mass.....1196
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
Isbell-Porter Co., Newark, N. J.....1184
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1197
Ludlow Valve Manufacturing Co., Troy, N. Y.....1196
R. D. Wood & Co., Philadelphia, Pa.....1198
Stacey Mfg. Co., Cincinnati, O.....1199
The Gas Machinery Co , Cleveland, O.....1176
The P. H. & F. M. Roots Co., Connersville, Ind.....1187
Western Gas Construction Co., Fort Wayne, Ind.....1156

(Continued on page 1174.)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, PA., June 9, 1909.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1909, to stockholders of record at the close of business, June 30, 1909. Checks will be mailed.

1775-5 LEWIS LILLIE, Treasurer.

Position Wanted

As Superintendent,

By a competent gas man who has had practical experience in all branches of the business, both coal and water gas. At present employed. A-1 references.

1755-tf Address, "R. C.," care this Journal.

Position Wanted.

An American man, 42 years of age, with 22 years' experience as superintendent of coal gas plant, would like position with a gas company anywhere in the U. S. or Canada. Will accept any capacity. Mains a specialty. Address, "G. G.,"

1777-1 Care this Journal.

WANTED,

Position as an Up-to-Date Foreman

In meter department, or repairer or prover. Central States preferred. Fifteen years' experience. With references. Address, "DISC,"

1777-1 Care this Journal.

Position Wanted

As Manager or Superintendent,

By a man who has had experience and is familiar with the manufacture and distribution of coal and water gas and can deliver the goods. Address, "O. K.,"

1777-2 Care this Journal.

WANTED.

POSITION AS SUPERINTENDENT.

Salary, $1,500 per year. A-No. 1 references from present and past employers. Good reasons for making change. Address, "P. O.,"

1777-1 Care this Journal.

WANTED,

For Western territory, an aggressive and competent traveling salesman for a leading line of gas ranges and heaters. State age and experience.

Address, "MANUFACTURER,"

1767-tf Care this Journal.

WANTED,

COMPETENT DRAFTSMAN.

Must have thorough knowledge of gas bench designing. Position permanent and salary liberal for right party. State experience.

1775-tf Address, "BENCH," care this Journal.

GAS PLANT WANTED.

The controlling stock interest in a gas plant in a town of 12,000 to 25,000 population, where main extensions and up-to-date business management would increase the business. Correspondence will be treated confidentially. Give as much detail as consistent. Address, "CAPITAL,"

1775-3 Care this Journal.

WANTED,

One Second-Hand Steel Tank Gasholder.

Capacity, 50,000 to 100,000 feet. Must be in good condition. State size, price and where same may be inspected.

1776-2 Address, "GAS," care this Journal.

FOR SALE,

One set of 4 purifying boxes 12 feet 8 inches by 10 feet 9 inches by 3 feet, in good condition, with centerseal and 10-inch connections. Also one American 8-foot station meter.

1771-tf YORK GAS CO., York, Pa.

(Concluded from page 1173.)

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City 1193
F. Behrend, New York City 1174
The United Gas Improvement Co., Philadelphia, Pa. ... 1191

EXHAUSTERS.

Connelly Iron Sponge & Governor Co., New York City 1193
Connersville Blower Company, Connersville, Ind. 1200
Davis & Farnum Mfg. Co., Waltham, Mass. 1196
Isbell-Porter Company, Newark, N. J. 1184
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1197
Piqua Blower Co., Piqua, O. 1185
The P. H. & F. M. Roots Co., Connersville, Ind. 1187

HIGH PRESSURE GAS GOODS.

H. Mueller Manufacturing Co., Decatur, Ills. 1179

PURIFIER AND SCRUBBER TRAYS.

Bartlett-Hayward Co., Baltimore, Md. 1197
Cabot Mfg. Co., Hoboken, N. J. 1195
Western Gas Construction Co., Fort Wayne, Ind. 1156

PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills. 1179

GAS PLANT TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills. 1179

GAS STOVES.

American Meter Co., New York and Philadelphia 1189
Keystone Meter Co., Royersford, Pa. 1202
Maryland Meter & Manufacturing Co., Baltimore, Md. ... 1202
Nathaniel Tufts Meter Co., Boston, Mass. 1202

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich. 1186

GASHOLDERS.

Bartlett-Hayward Co., Baltimore, Md. 1197
Continental Iron Works, Brooklyn, N. Y. 1194
Cruse-Kemper Co., Philadelphia, Pa. 1184
Davis & Farnum Mfg. Co., Waltham, Mass. 1182
Deily & Fowler Mfg. Co., Philadelphia, Pa. 1200
Economical Gas Apparatus Construc. Co., Toronto, Ont. 1174
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1197
R. D. Wood & Co., Philadelphia, Pa. 1198
Riter-Conley Mfg. Co., Pittsburgh, Pa. 1183
Stacey Mfg. Co., Cincinnati, O. 1199
Western Gas Construction Co., Fort Wayne, Ind. 1156

STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md. 1197
Davis & Farnum Mfg. Co., Waltham, Mass. 1196
Quintard Iron Works, New York City 1185
Stacey Mfg. Co., Cincinnati, O. 1199
Western Gas Construction Co., Fort Wayne, Ind. 1156

PATENTS, TRADE-MARKS AND COPYRIGHTS.

Royal E. Burnham, Washington, D. C. 1195

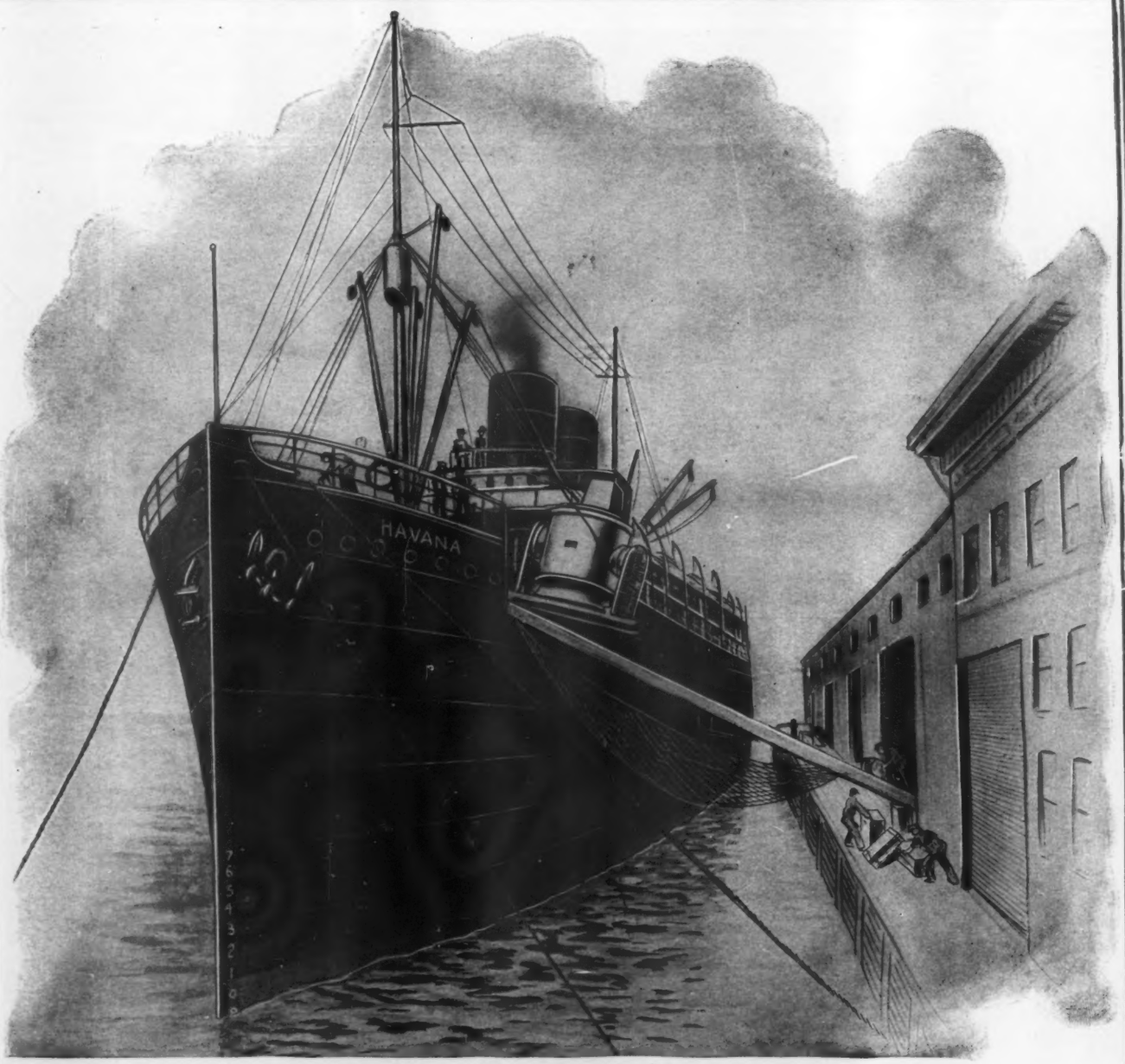
Utilize Your Gas Liquor.
NO EXTRA LABOR OR OPERATING EXPENSES.
IMPROVED AMMONIA CONCENTRATOR.
About 100 in use. Write to
STROH & OSIUS, Patentees, or
MICHIGAN AMMONIA WORKS, - Detroit, Mich.

WILLIAM A. BAEHR,
CONSULTING ENGINEER,
Commercial National Bank Building,
CHICAGO.
Also Representing
The Bartlett-Hayward Company.

Celebrated Lux Gas Purifying Mass
Will Save 50 Per Cent. Labor.
Used in the Gas Works of Berlin, Kiel, Frankfort, Vienna, Amsterdam, Antwerp, London, Edinburgh, Copenhagen, Madrid, Seville, Barcelona, Rio de Janeiro and others. :: :: ::
Sole Importer, F. BEHREND,
54 Front St., New York.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,
Consulting Engineers.
Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::
PLANS, SPECIFICATIONS AND ESTIMATES PREPARED.
AMERICAN OFFICE:
269 Front St., East, Toronto, Canada.

GAS BLAST FURNACES
—AND—
HEATING MACHINES
—FOR—
INDUSTRIAL PURPOSES.
STATE
AMOUNT
SIZE . . . . OF WORK TO BE DONE IN GIVEN TIME.
KIND . . .
AMERICAN GAS FURNACE COMPANY,
24 JOHN STREET, . . . NEW YORK, N. Y.
CATALOGUE SENT ON APPLICATION.



Scene on Ward S. S. Line Pier, New York, when a 250,000 cu. ft. per hour

ROTARY STATION METER

was loaded on board S. S. Havana for delivery to **Compania de Gaz y Electricidad, Habana, Cuba.** We can ship by water and rail—freight or express—it's all the same to us so long as the customer gets the goods.

It is time to stop "guessing"—some dignify it by calling it "estimating"—the results obtained in a gas works. Put in a Rotary Station Meter and know what is doing. Rotary Meters are annually saving their cost in scores of gas works.

ROTARY METER COMPANY

Rotary Station Meters can be supplied for any capacity between 1,500 cu. ft. per hour and 250,000, or more, cu. ft. per hour.

One-half the Cost—One-tenth the Space of Old Style Wet Meters.

When in need of Station Meters write

ROTARY METER COMPANY

Send for Catalog. **280 Broadway, NEW YORK.**

P. PLANTINGA, President W. E. STEINWEDELL, Secretary

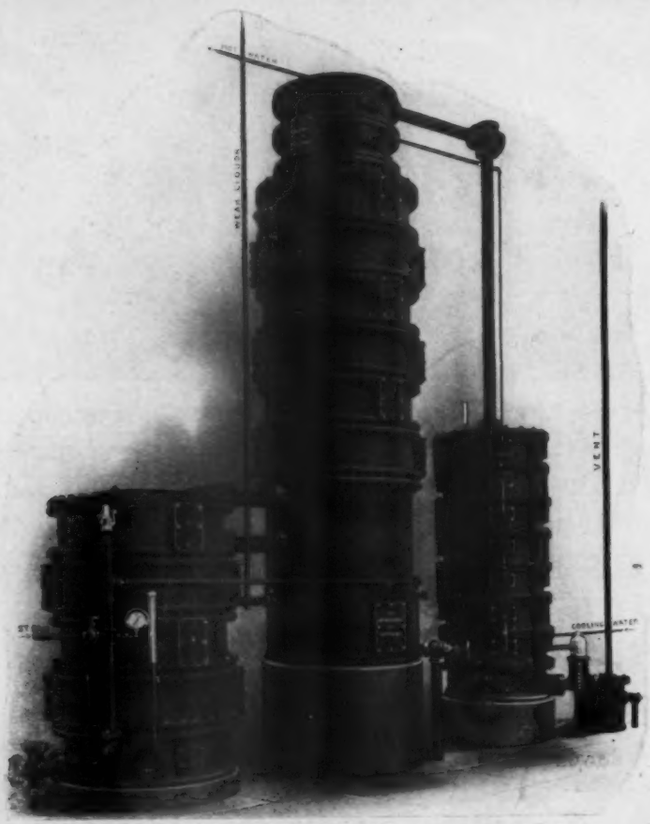
THE GAS MACHINERY CO.,

Main Office and Shops

CLEVELAND, OHIO.

NEW YORK OFFICE, - - 56 PINE STREET.

COAL AND WATER GAS APPARATUS,
EXHAUSTERS, CONDENSERS, SCRUBBERS,
TAR EXTRACTORS, WASHERS, PURIFIERS,
VALVES, CONNECTIONS,
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.



FREE AND FIXED AMMONIA STILLS AND ABSORBER.

THE GAS MACHINERY CO.
CLEVELAND, OHIO.

DIDIER-MARCH COMPANY,

Hudson Terminal Building,

WORKS:
Keasbey, Perth Amboy, N. J.

50 Church Street,
NEW YORK, N. Y.

DESSAU SYSTEM OF VERTICAL RETORTS,

"The Only System in Successful Operation."

U. S. Patent No. 904043.
"Process Patent for the Carbonization of Coal in Vertical Retorts."

U. S. Patent No. 801268.
"Operating Mechanism for Bottom Mouthpieces."

U. S. Patent No. 906187.
"Feeding Device."

U. S. Patent No. 899503.
"Retort House."

U. S. Patent No. 915156.
"Recuperation."

388 Benches, with 3984 Retorts in operation and under construction.

TOTAL DAILY PRODUCING CAPACITY, 60,000,000 CUBIC FEET.

First Installation in the United States of America,

PROVIDENCE, R. I., 12 BENCHES, 120 RETORTS,

Complete, with

Retort House, Coal and Coke Handling Machinery and Storage Bins.

HORIZONTALS AND INCLINES OF APPROVED TYPES.

Correspondence Solicited. FREDERICK J. MAYER, General Manager.

WE STOP CLINKERS.

Send for Bulletin.

WORKMANSHIP AND MATERIAL CANNOT BE EXCELLED.

IF YOU ARE SATISFIED WITH PRESENT COST OF GAS IN YOUR HOLDER WE CANNOT INTEREST YOU, BUT IF YOU ARE NOT SATISFIED, WRITE US.

NEW BENCHES—REFILLINGS.

THE IMPROVED EQUIPMENT COMPANY,

MAIN OFFICES: 60 WALL STREET, NEW YORK, N. Y.

SOLE LICENSEES FOR THE DOHERTY BENCH FUEL ECONOMIZER.

LONG DISTANCE TELEPHONE, 1503-D.

FRANK D. MOSES, President.

GAS ENGINEERING CO.,

MANUFACTURERS AND ERECTORS OF

COMPLETE GAS WORKS.

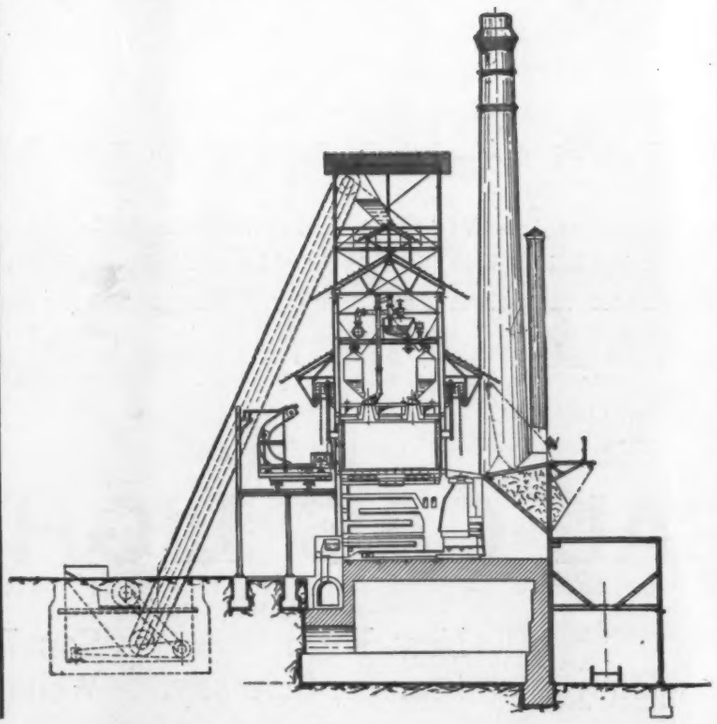
SPECIAL ATTENTION GIVEN TO LARGE PURIFIERS.

OFFICE AND WORKS, - - - - - - TRENTON, N. J.

CHAMBER OVENS.

Do You Know About Chamber Ovens?

Horizontal, Vertical, or Inclined.



If your output is over 250,000 feet per diem don't fail to consult

THE CHAMBER OVEN CO.,

405 Keene St.,

MILWAUKEE, WIS.

FRED. BREDEL, President.

WM. H. CAMPBELL, Eastern Agent,

Virginia State Insurance Building, Richmond, Va.

Mueller Gas Meter Couplings And Fittings.

The core work in Mueller Gas Meter Couplings and Fittings is done with great care and with the express purpose of making walls uniformly thick and without thin spots.

That is the very reason why they have walls of uniform thickness without thin spots. In addition they have good, strong threads.

Unconditionally Guaranteed.

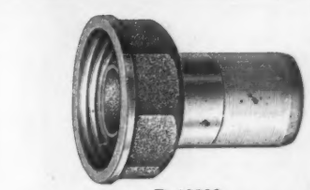
TRADE MARK MUELLER REGISTERED

H. MUELLER MFG. CO.

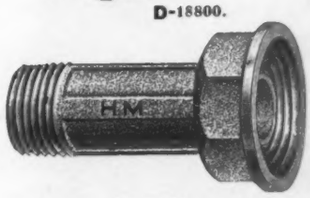
Works and General Offices, DECATUR, ILL., U. S. A. West Cerro Gordo St.

Eastern Division, NEW YORK, N. Y., U. S. A. 254 Canal St. (cor. Lafayette).

Chicago Branch, CHICAGO, ILL., U. S. A. 37 Dearborn St.



D-18800.



D-18801.

D-18803.

(Patent Applied for.) D-18808.

(Patent Applied for.) D-18804.

D-18802.

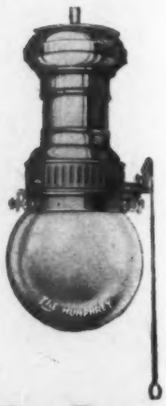
(Patent Applied for.) D-18807.

D-18806.

THE HUMPHREY GAS ARC LAMP.

Designed, Developed and Distinguished as

"THE GAS COMPANY'S LAMP,"



Has been one of the most conspicuous successes of the past decade in lighting lines. The competing lamps that were brought out in scores during the earlier days had but a brief life and exist to-day principally as unpleasant memories of ill-considered purchases. **Is not the same thing about to be repeated with Inverted Gas Arc Lamps?**

Adopt the **Humphrey Inverted** as your standard and be insured and protected by the strongest, most liberal and progressive gas lighting organization in the world.

GENERAL GAS LIGHT CO.,

Kalamazoo. **New York.** **San Francisco.**
London, England. **Bremen, Germany.** **Wellington, New Zealand.**

IT IS ABSOLUTELY NECESSARY

that people be reminded continually that you are ready to sell them the things they want. This is a big world, with lots of people in it, and you are easily forgotten if you don't keep buyers posted. What you should do is to tell them about your product to-day, remind them to-morrow, and keep on reminding them thereafter. If you do this, when the buyer is ready to place his order he will remember you. :: :: :: :: :: :: :: :: :: ::

An Advertisement in the AMERICAN GAS LIGHT JOURNAL

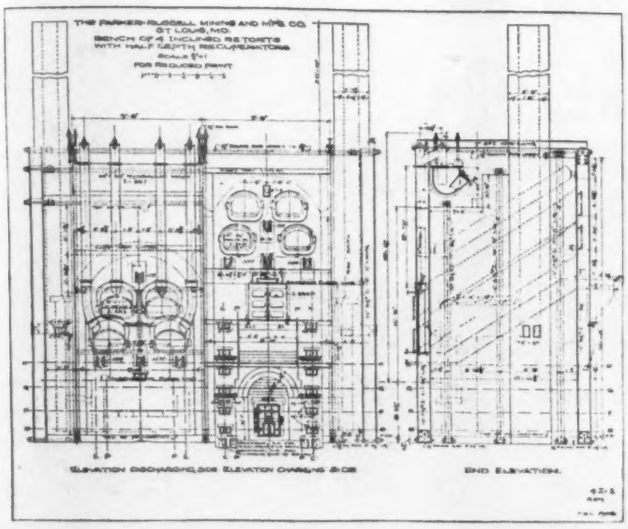
is the best and surest means of keeping your name and product before the buyers. :: ::

THE PARKER-RUSSELL MINING AND MFG. CO.,

Saint Louis, Missouri. **New York Office, 45 Broadway.**

GAS RETORT BENCHES OF EVERY DESCRIPTION.

WATER GAS LININGS, STOKING MACHINERY, RETORT HOUSES.



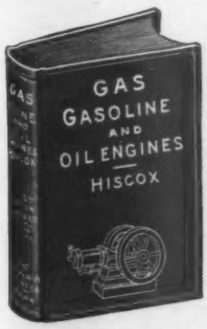
This plan shows a bench of inclined fours designed to go in existing retort houses.

Large production of gas, low fuel requirements, reduction in labor.

When you deal with us you get retorts and other fireclay goods we manufacture. We do not buy from others. We know the quality when we ship.

Correspondence Solicited.

All Contracts Made as of Saint Louis.



JUST PUBLISHED, 15TH EDITION, REVISED, ENLARGED AND RESET.

Gas, Gasoline and Oil Engines,

INCLUDING GAS PRODUCER PLANTS,

By GARDNER D. HISCOX, M.E.

Author of "MECHANICAL MOVEMENTS," "COMPRESSED AIR," Etc.

PRICE, - - - - - $2.50.

The only complete American book on the subject for Gas Engine Owners, Gas Engineers and intending purchasers of gas engines, treating fully on the construction, installation, operation and maintenance of gas, gasoline, kerosene and crude petroleum engines.

The new rewritten, enlarged and revised 15th edition of this work has been prepared to meet the increasing demand for a thorough treatise on the subject. Its 450 pages give general information for everyone interested in this popular motive power and its adaptation to the increasing demand for a cheap and easily managed motor requiring no licensed engineer. It is fully illustrated by 351 Engravings and Diagrams. For sale by

A. M. CALLENDER & CO., - - - - - 42 Pine Street, New York City.

Gas Companies' Bookkeeping,

1906 EDITION,

By JOHN H. BREARLEY and BENJAMIN TAYLOR.

A Practical Treatise on the Keeping of Gas Companies' Accounts,

WITH USEFUL

FORMS FOR GAS UNDERTAKINGS.

PRICE, CLOTH, $4.50, MOROCCO, $6.50.

FOR SALE BY

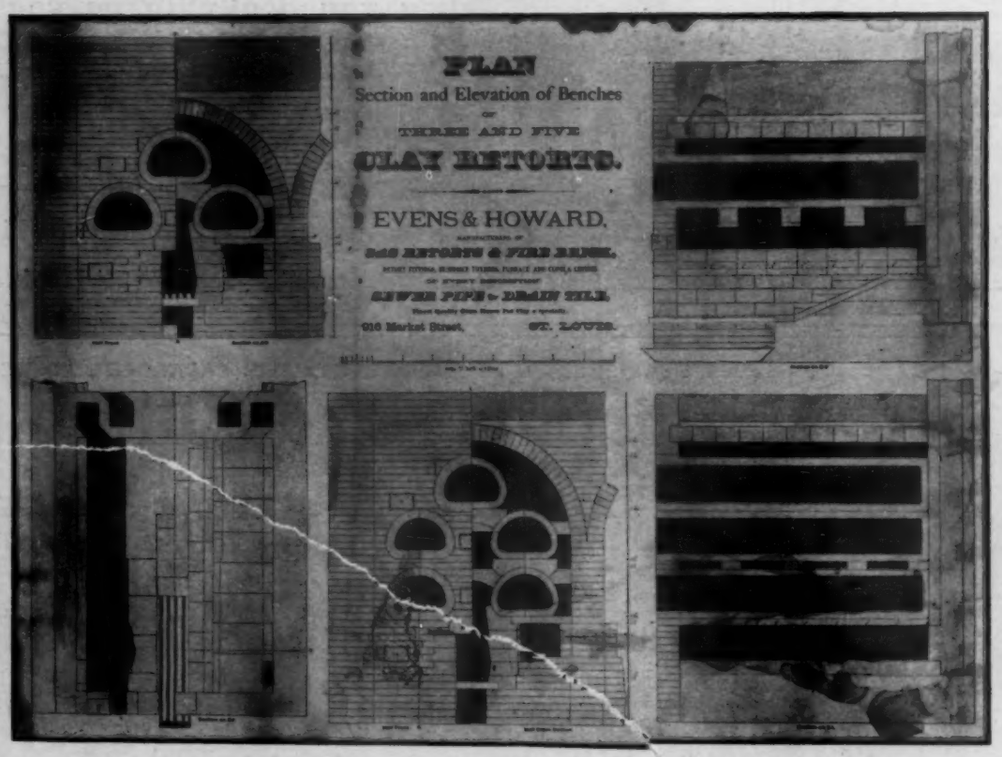
A. M. CALLENDER & CO., - - - 42 Pine Street, New York City.

EVENS & HOWARD FIRE BRICK CO

THE PIONEER
MANUFACTURERS
OF
FIRECLAY RETORTS.

WE HAVE BEEN MAKING THE BEST BENCH MATERIAL SINCE

1856.



This is an actual photograph of an ancient drawing, over 30 years old, used by us when we first commenced making retorts.

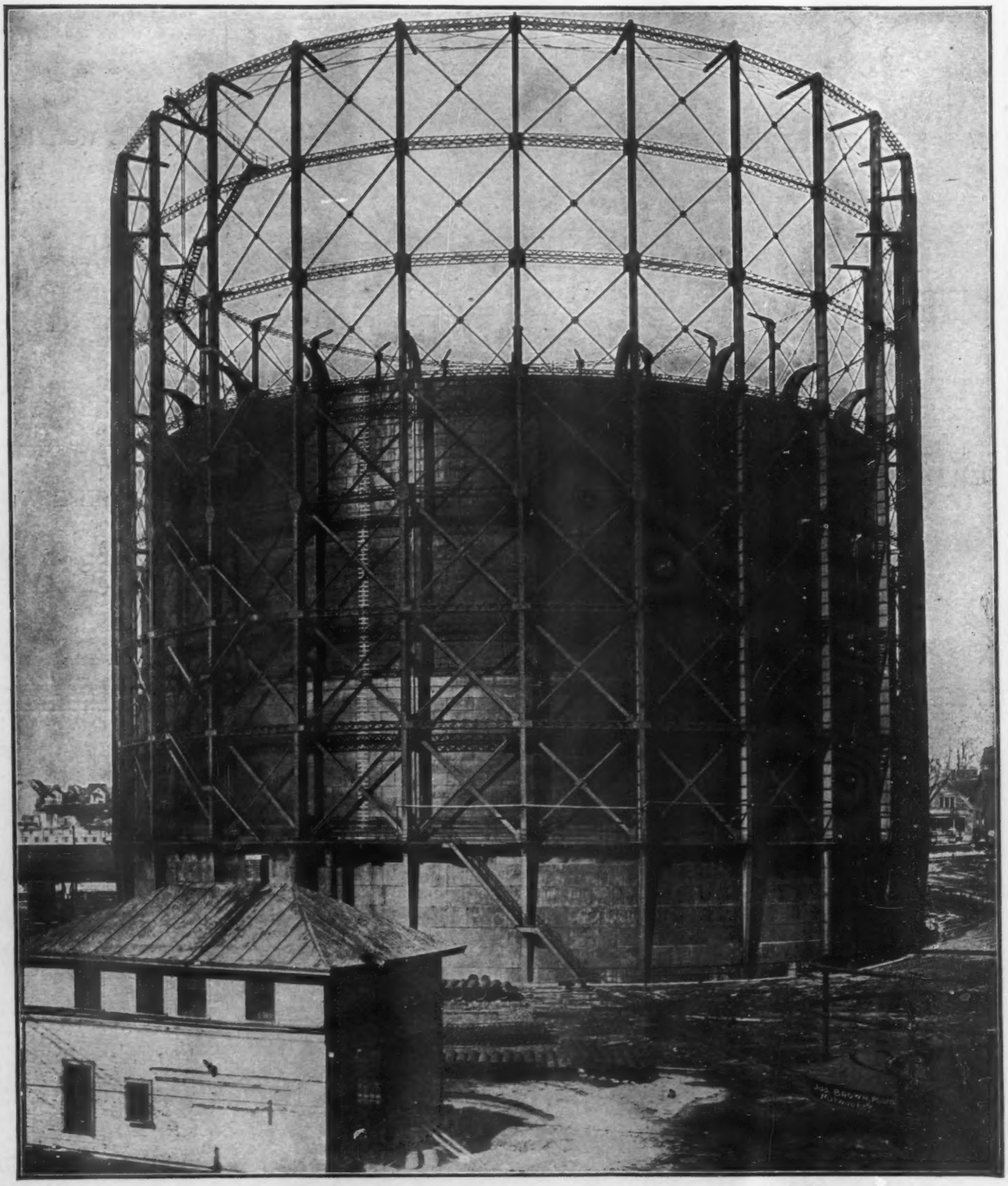
OUR AIM IN 1909.

You need better quality material now than in the old days, as the work on a gas bench is much harder than it was. Heats are higher, charges more frequent; and you can not spare time to shut down, patch retorts, or reline furnace. Machine charging is very severe on the retorts and settings. You will concede that the present-day retort, with its 20 to 26 months' life, is not going to help you to make a cheap gas. Sooner or later you are going to investigate our statements about STAR RETORTS. Our engineers are aiming to keep up their reputation for the 1,200-day life. You know this is a Company which has always lived up to its promises, and can rely upon getting only the best material when you have our word for it.

You know our material has always been good. We want you also to know our designs and construction are better than you have been able to get in recent years.

GAS WORKS DIVISION: A. S. B. LITTLE, Engineer.

SAINT LOUIS · MISSOURI



The Largest Steel Tank Gasholder in the World, 225 Feet 9 Inches Diameter, 35 Feet Deep, Five Lifts.

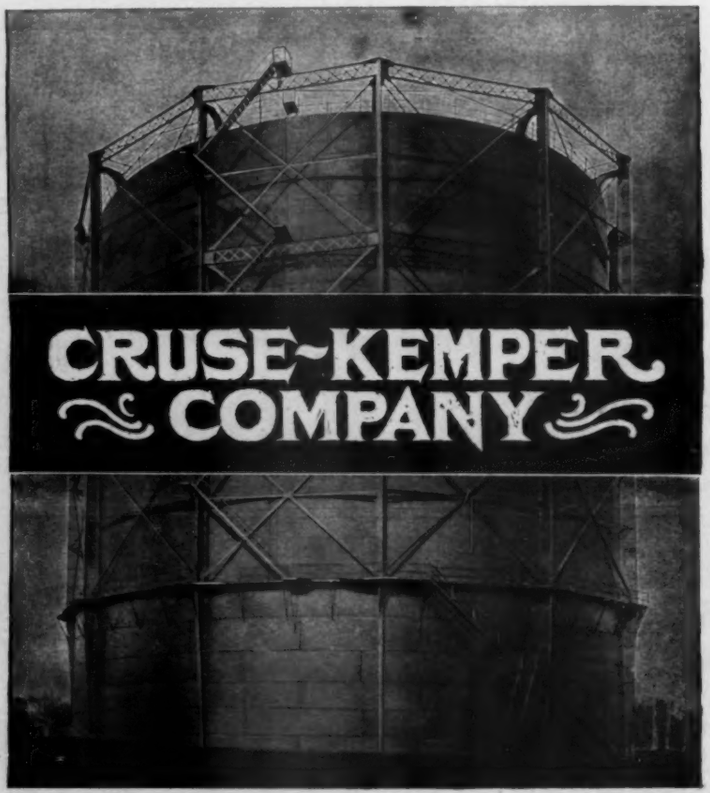
RITER-CONLEY MFG. CO.,

PITTSBURGH.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

COMPLETE COAL GAS PLANTS.

GAS ENGINEERS,
BUILDERS OF
GAS HOLDERS,
PURIFIER BOXES,
CONDENSERS,
SCRUBBERS,
STEEL TANKS,
PLATE METAL CONSTRUCTION.



STEEL WATER
AND
TRANSMISSION
TOWERS.
STEEL BUILDINGS and ROOF TRUSSES.
STRUCTURAL IRON & STEEL WORK IN GENERAL.

OFFICE AND WORKS, - - - - AMBLER, PA.

J. S. DeHART, JR., PRESIDENT
A. F. WEHNER, SECRETARY
R. K. WEHNER, TREASURER

ISBELL-PORTER COMPANY

GAS ENGINEERS & BUILDERS OF GAS WORKS

BENCH WORK
CHARGING AND DISCHARGING MACHINERY
MACKENZIE EXHAUSTERS
PRIMARY AND SECONDARY CONDENSERS FOR FRESH OR SALT WATER

ISBELL VALVES
SPECIALS
TAR EXTRACTORS
P&A. TAR EXTRACTORS FOR WATER GAS
ROTARY AMMONIA SCRUBBERS
SHAVING SCRUBBERS
PURIFIERS
STREET GOVERNORS

MAIN OFFICE AND WORKS
BRIDGE & OGDEN STREETS
NEWARK, N. J.
ESTABLISHED 1865

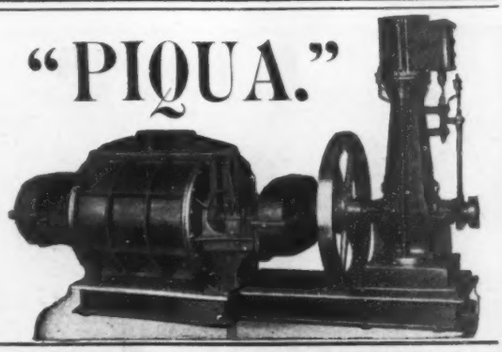
GAS EXHAUSTERS AND BLOWERS.

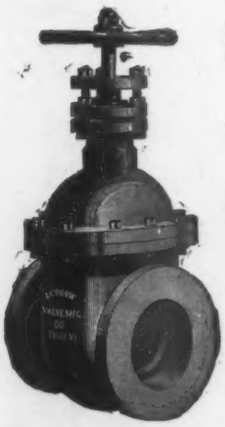
We have a full line of sizes for all standard pressures. The design, material and workmanship is A-1. Prompt Delivery and Reasonable Prices. WHY NOT give us YOUR requirements?

THE PIQUA BLOWER CO.,

PIQUA, OHIO.

"PIQUA."





THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

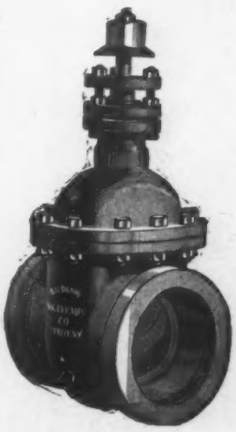
Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.



QUINTARD IRON WORKS CO.,

Foot of Twelfth Street and East River, New York,

BENCH WORK,
CONDENSERS,
SHAVING SCRUBBERS,
CAST IRON FLANGED PIPE,
RIVETED STEEL PIPE.

FREDERICK W FLOYD, Engineer.

ESTABLISHED 1856.

HENRY MAURER & SON,

Manufacturers of

High Grade Firebrick, Blocks, Tiles,

ETC.,

Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.

L. C. HAMLINK, PRES. AUGUST COURT, SEC'Y.

GAS BENCH CONSTRUCTION COMPANY,

METROPOLITAN BUILDING, ST. LOUIS, MO.,

Engineers and Builders of all styles of Standard and Special Benches from one to twelve Retorts, Horizontal, Vertical, or Inclined.

We will guarantee "Better Benches," to be easier to control, make more gas per retort, and operate with less fuel than any bench on the market.

ALL WORKMANSHIP AND MATERIAL GUARANTEED.

PRACTICAL HANDBOOK ON GAS ENGINES, WITH INSTRUCTIONS FOR CARE AND WORKING OF THE SAME.

By G. LIECKFELD, C.E. Translated with Permission of the Author, by GEORGE M. RICHMOND, M.E. Price, $1.

For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

"IRONCLAD" DRY GAS METERS

Are equally suitable for the measurement of either Artificial or Natural Gas.

CATALOGUE 100 FREE

Pittsburg Meter Company

New York, 149 Broadway.
Chicago, 256 Madison St.
Kansas City, 6 West 10th St.
Minneapolis, 409-411 2d Av., S.

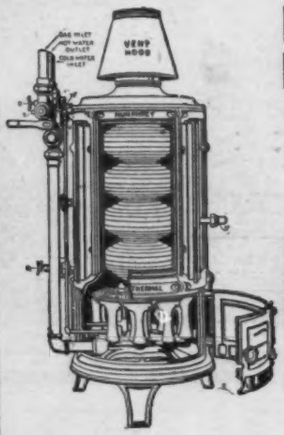
General Office and Works,
East Pittsburg, Pa.

Manufacturers of Gas Meters and Water Meters

LLOYD CONSTRUCTION COMPANY

GAS APPARATUS.

DETROIT—MICHIGAN



Humphrey Auto-Thermal Instantaneous Water Heaters

Have every known desirable feature helping to efficiency, economy, durability and absolute safety.

FULLY GUARANTEED.
PRICES LOW.
QUALITY AND SERVICE HIGH.

Will you help us sell them?

HUMPHREY CO.,
Kalamazoo, Mich., U. S. A.

"THE MINER"
GLOBE STREET LAMPS.

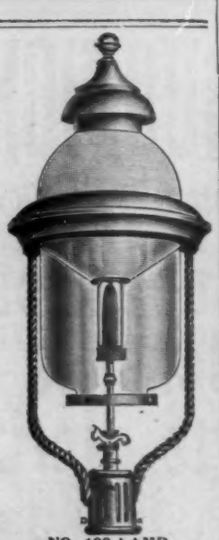
OVER FORTY YEARS IN USE THE WORLD OVER.

THE BEST STREET LAMPS for ALL KINDS OF GAS OR BURNERS.

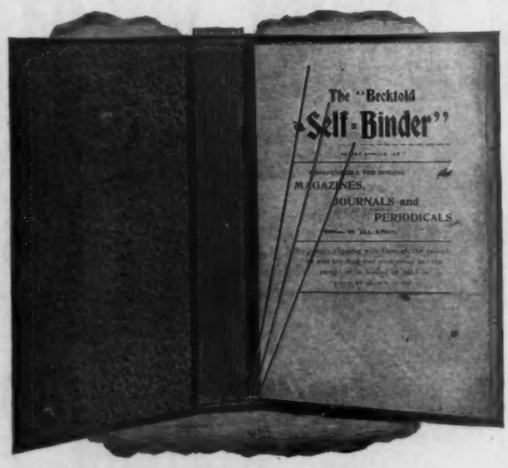
This is only one of a Large Variety of Styles.

SEND FOR CATALOGUE.

THOS. T. W. MINER,
821 and 823 Eagle Avenue,
New York.



NO. 100 LAMP.



Binder FOR THE **Journal.** PRICE, **$1.**

For Sale by
A. M. CALLENDER & CO.,
42 Pine Street, New York City.

THE SEVENTH EDITION, ILLUSTRATED,

—OF THE—

Handbook for Gas Engineers and Managers,

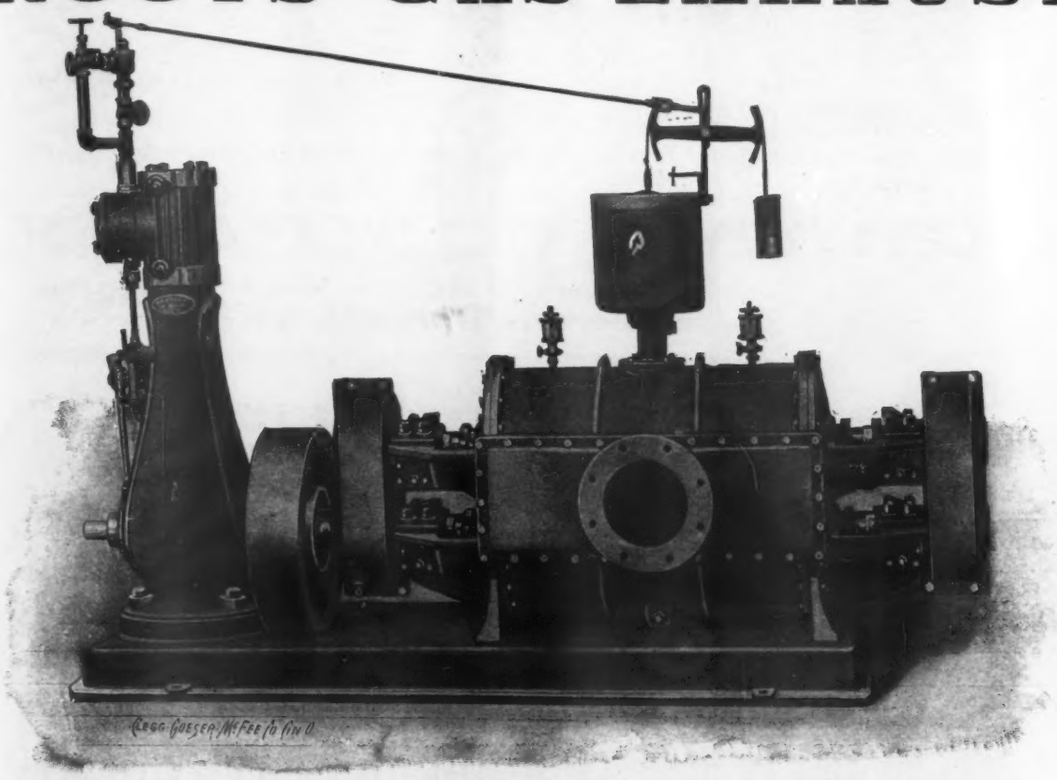
By THOMAS NEWBIGGING, M. INST. C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry.

PRICE, · $6.50.

A. M. CALLENDER & CO., 42 Pine Street, New York City.

50TH ANNIVERSARY.
ROOTS' GAS EXHAUSTERS.



Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

P. H. & F. M. ROOTS COMPANY,

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Bldg.

SEND FOR POCKET EDITION OF "ENGINEERS' PRACTICAL REFERENCE BOOK."

The "Gas World" Analyses of Accounts of Gas Undertakings,
For 1906-1907,

Showing at a glance the Accounts of 113 Coal and Water Gas Companies, Itemized under

Coal Carbonized, Gas Made and Sold, Yield of Residuals, Public Lamps, Mileage of Mains, Consumers, Price of Gas, Illuminating Power, Financial Results, Revenue.

Manufacturing Charges, Rates and Taxes, Distribution Charges, Management Charges, Bad Debts, Capital Paid Up, Capital per Ton and per Thousand, Reserve Funds, etc.

EVERY GAS ENGINEER AND MANAGER SHOULD HAVE A COPY OF THIS INVALUABLE AND UP-TO-DATE WORK.

Price, $4. For Sale by

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

Gas Analyst's Manual,

By JAQUES ABADY, M. Inst. Mech. E.

(Incorporating F. W. Hartley's "Gas Analyst's Manual" and "Gas Measurement.")

Ninety-three Illustrations and Nine Folding Plates.
Bound in Handsome Half Leather. Price, - $6.50.

FOR SALE BY

A. M. CALLENDER & CO., - - 42 Pine Street, New York City.

BRAY BURNERS HAVE BEEN USED FOR MORE THAN FORTY YEARS.

In that time they have been recommended and used by the leading gas experts, endorsed by the U. S. Government Inspectors of Gas, as well prominent State Inspectors.

To-day the Bray is the only high-grade, absolutely reliable open flame burner on the market.

W. M. CRANE COMPANY,

16, 18 and 20 West 32d Street, New York.

SOLE AGENTS FOR GEO. BRAY & CO., LEEDS, ENGLAND.

GEORGE ORMROD, Pres. & Treas. JOHN D ORMROD, Supt.
J. G. EBERLEIN, Secretary.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

CAST IRON GAS & WATER PIPE

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

TRADE MARK

BRISTOL'S

REG. U. S. PAT. OFFICE.

RECORDING GAUGES

For All Commercial Ranges of

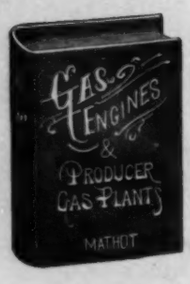
PRESSURE AND VACUUM.

Write for New Preliminary Bulletin No. 104.

BRANCH OFFICES: { New York. Chicago.

THE BRISTOL CO., WATERBURY, CONN.

MODERN GAS ENGINES and PRODUCER GAS PLANTS,



By R. MATHOT, M.E.,

Containing a Preface by DUGALD CLERK, F.C.S., Indorsing the Book.

A PRACTICAL Treatise of 320 pages, Fully Illustrated by 175 Detail Illustrations, Setting Forth the Principles of Gas Engines and Producer Design, the Selection and Installation of an Engine, Conditions of Perfect Operation, Producer Gas Engines and their Possibilities, the Care of Gas Engines and Producer Gas Plants, with a Chapter on Volatile Hydrocarbons and Oil Engines.

Price, $2.50. For Sale by

A. M. CALLENDER & CO., - 42 Pine Street, New York City.

STANDARD REDUCTION FACTORS FOR GASES,

A Number of Tables Necessary for the Reduction of the Volume of any Gas at any Temperature, Pressure and Degree of Saturation to its Equivalent Volume under Standard Conditions,

TOGETHER WITH

A Table for the Numerical Solution of Certain Exponential Equations,

By HELON BROOKS MacFARLAND, B.S, M.M.E.,

Associate Professor of Applied Mechanics, Department of Mechanical Engineering, Armour Institute of Technology, Chicago, Ills.

PRICE, $1.50. For Sale by

AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

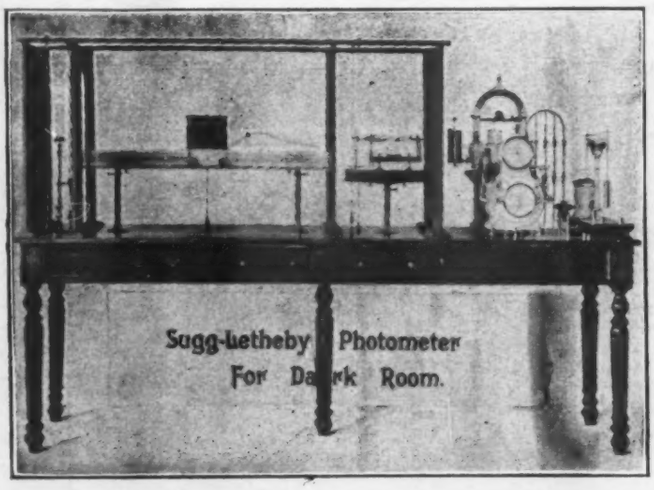
JULY, 1909.

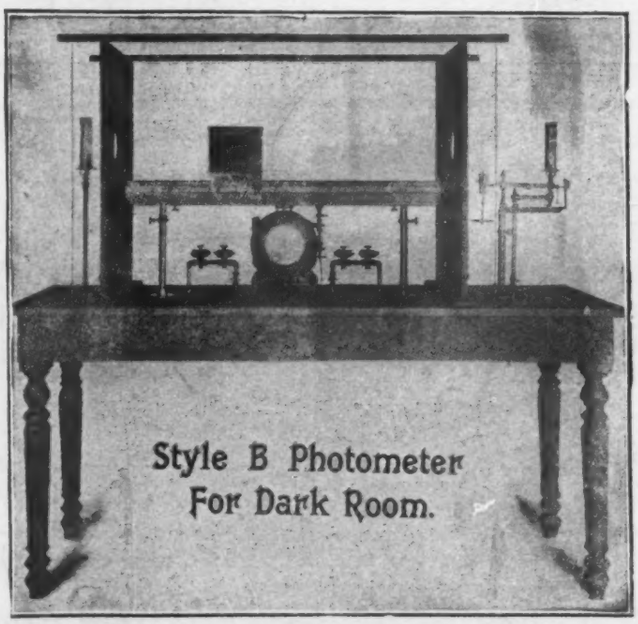
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Thu.	1	2.30AM	3.30AM
Fri.	2	No L.	No L.
Sat.	3	No L FM	No L.
Sun.	4	No L.	No L.
Mon.	5	8.00PM	10.40PM
Tue.	6	8.00	11.20
Wed.	7	8.00	11.50
Thu.	8	8.00	12.20AM
Fri.	9	8.00LQ	12.50
Sat.	10	8.00	1.20
Sun.	11	8.00	1.50
Mon.	12	8.00	2.20
Tue.	13	8.00	3.40
Wed.	14	8.00	3.40
Thu.	15	8.00	3.40
Fri.	16	8.00NM	3.40
Sat.	17	8.00	3.40
Sun.	18	8.00	3.50
Mon.	19	8.00	3.50
Tue.	20	8.00	3.50
Wed.	21	9.10	3.50
Thu.	22	9.30	3.50
Fri.	23	9.50	3.50
Sat.	24	10.20	3.50
Sun.	25	10.40FQ	3.50
Mon.	26	11.10	3.50
Tue.	27	11.40	3.50
Wed.	28	12.20AM	3.50
Thu.	29	1.10	3.50
Fri.	30	2.10	3.50
Sat.	31	No L.	No L.

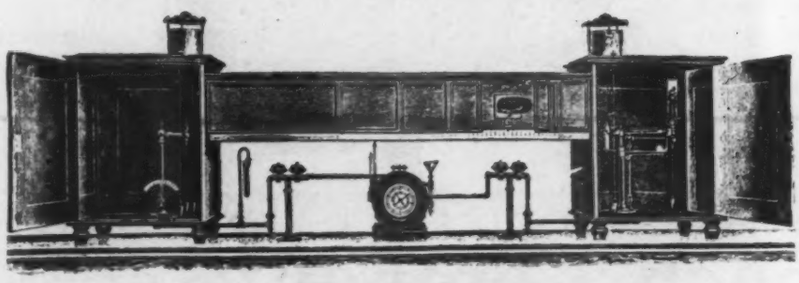
TOTAL HOURS DURING 1909.

By Table No. 1.

	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JULY, 1909.

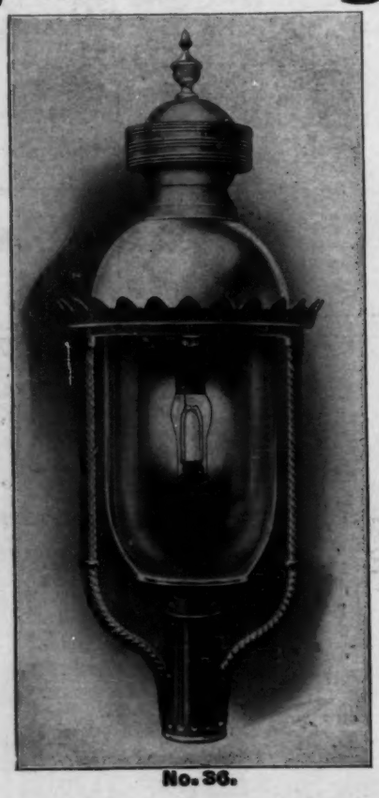
Day of Week.	Date.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A.M.
Thu.	1	7.27	3.07
Fri.	2	7.22	3.07
Sat.	3	7.22	3.07
Sun.	4	7.22	3.07
Mon.	5	7.22	3.07
Tue.	6	7.22	3.07
Wed.	7	7.22	3.07
Thu.	8	7.22	3.07
Fri.	9	7.17	3.12
Sat.	10	7.17	3.12
Sun.	11	7.17	3.12
Mon.	12	7.17	3.12
Tue.	13	7.17	3.12
Wed.	14	7.17	3.12
Thu.	15	7.17	3.12
Fri.	16	7.12	3.17
Sat.	17	7.12	3.17
Sun.	18	7.12	3.17
Mon.	19	7.12	3.17
Tue.	20	7.12	3.17
Wed.	21	7.12	3.17
Thu.	22	7.12	3.17
Fri.	23	7.07	3.22
Sat.	24	7.07	3.22
Sun.	25	7.07	3.22
Mon.	26	7.07	3.22
Tue.	27	7.07	3.22
Wed.	28	7.07	3.22
Thu.	29	7.07	3.22
Fri.	30	7.02	3.27
Sat.	31	7.02	3.27

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY



No. 36.

....OF AMERICA....

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

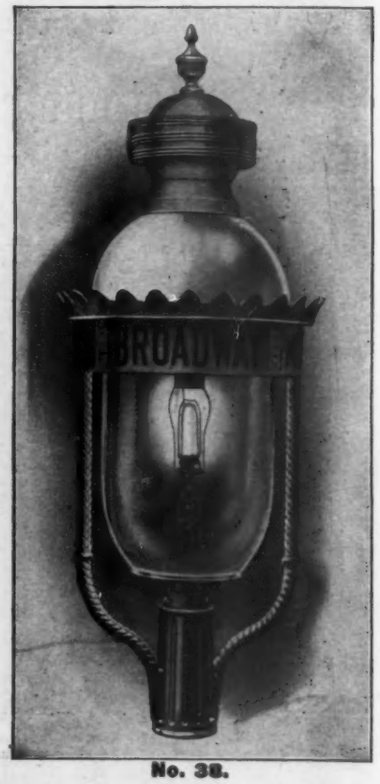
POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.



No. 38.

Welsbach Junior

THE BIGGEST LITTLE LIGHT IN THE WORLD.

The Welsbach Junior Light is 5 inches high--consists of burner, mantle and chimney--and is attractively boxed in a pasteboard carton.

As its effectiveness and economy become better known the Welsbach Junior will supersede, for universal use in the home, the old-style open flame gas burners.

Showing Welsbach Junior Light used in connection with ordinary glass globe.

Gives 80-Candle Power.

Uses Two Feet of Gas per Hour.

Attaches to Any Gas Fixture.

Completely Hidden from View.

Use your own globe--either gas or electric.

SMALL—EFFICIENT—ECONOMICAL.

Welsbach Company, FACTORIES: Gloucester, N. J. Columbus, O.

Salesrooms in all Leading Cities of the United States.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

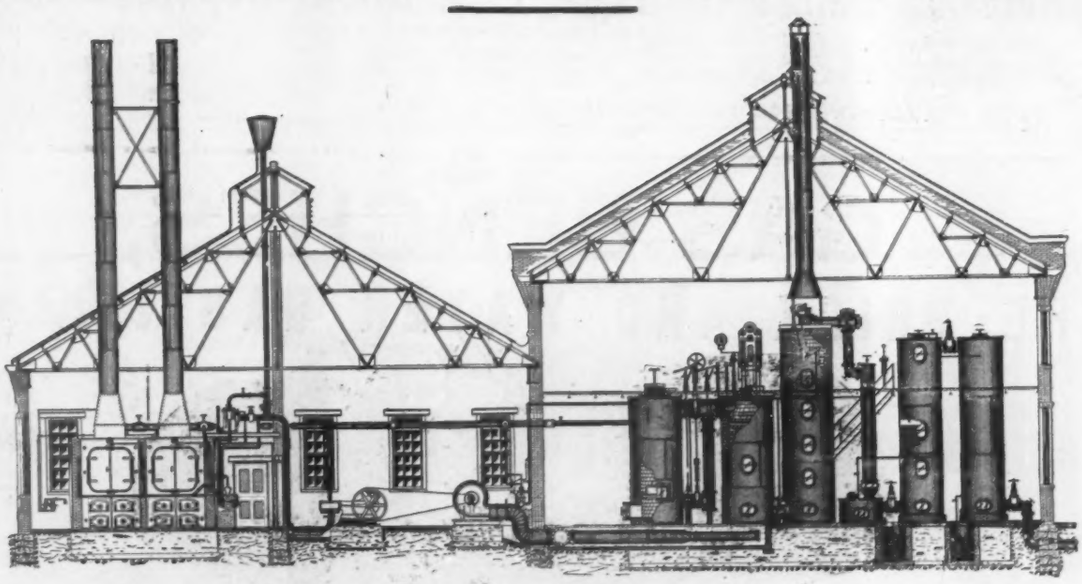
LESSEES, OPERATORS AND BUILDERS OF GAS WORKS.

Largest Builders of CARBURETTED WATER GAS PLANT IN AMERICA.

SOLE AMERICAN BUILDERS

OF THE

Standard Double-Superheater Lowe Water Gas Apparatus.



TOTAL SETS INSTALLED TO JULY 1, 1909, ... 704
TOTAL DAILY CAPACITY TO JULY 1, 1909, ... 577,440,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.
Waste Heat Boiler.
Hygrometer.
Meters for Regulating Air and Steam Supply to Water Gas Apparatus.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. NEW CASTLE, PA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 300 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
29 North Mill St., New Castle, Pa.

KRATER-DINAS RETORT CEMENT.

Universally accepted to be the best cement for patching and repairing retorts, making up bench work, etc. Advantages: Powdered form; only mix with water; no waste; too much mixed, apply water and use the next time; adheres very easy; does not fall out by decarbonization. We guarantee or take back. Many re-orders and recommendations from America, Germany, France, Belgium, etc. Write for price and testimonials.

STRASSBURGER BROS, Sole Importers,
563 Lincoln Avenue, Chicago, Ills.

"BEST BY TEST."

ESTABLISHED 1868.

L. N. RANCKE, V. Pres. & Mgr. E. L. RIEHA, Engineer.

BALTIMORE RETORT & FIREBRICK CO.

BALTIMORE, MD.

HIGH GRADE FIRECLAY MATERIAL FOR ALL PURPOSES.

DESIGNERS AND BUILDERS OF

BENCH CONSTRUCTIONS of the MOST DURABLE and EFFICIENT TYPE, WITH EITHER HORIZONTAL, INCLINED OR VERTICAL RETORTS.

SUPERIOR GRADE LININGS AND CHECKERBRICK FOR WATER GAS SETS.

WE SOLICIT YOUR INQUIRIES.

WALDO BROS., 102 Milk St., BOSTON, MASS.,
AGENTS FOR NEW ENGLAND STATES.

LARGE MODERN FACILITIES.
RAIL AND WATER CONNECTIONS TO ALL POINTS.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office: *411 Olive Street, Continental Bank,* ST. LOUIS, MO.

GAS BENCHES,

FIRE BRICK AND WATER GAS LININGS.

LATEST DESIGNS,
HIGHEST GRADE MATERIAL,
SUPERIOR WORKMANSHIP,
UNEQUALED RESULTS.

DESIGNS AND SPECIFICATIONS FURNISHED ON THE HORIZONTAL, INCLINED OR VERTICAL RETORT SYSTEMS FOR COMPLETE GAS WORKS.

LACLEDE-CHRISTY CLAY PRODUCTS CO.,

ST. LOUIS, MO.

EXPERT INSPECTION of Holders and Other Structures During Construction.
ECONOMIC DESIGN of Steel Structures, Reinforced Concrete, Masonry and Foundations.
CHAMBERS & HONE, Consulting Engineers, ... 1 Liberty Street, New York City.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada, Detroit, Seattle, Rochester and St. Louis.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

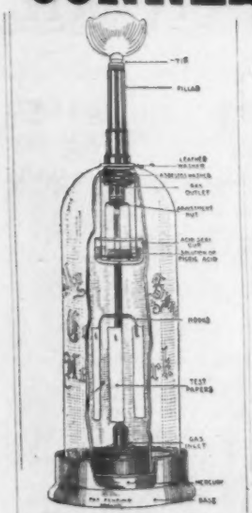
Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

G. A. BRONDER,
Contracting Engineer and Builder,
229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



SULPHUR TESTER

Automatic, Balance, High Pressure and Service Governors,

Unison Telemetric Pressure Gauge,

Iron Sponge, Purifying Material for Gas Purification, Manufacturers of Jones Jet Photometers, The National Smoke and Ammonia Helmet, Sulphur Testers, High and Low Pressure House Governors.

Wide Experience in High Pressure Installation and Extension.

PACIFIC COAST AGENT: VAN E. BRITTON, SAN FRANCISCO, CAL.

50 CHURCH ST., NEW YORK CITY.
295 WEST 22D ST., CHICAGO, ILLS.

12-Inch High Pressure Governor.

REYNOLDS' GAS REGULATOR COMPANY,

ANDERSON, IND., U. S. A.

We make all sizes for all classes of reduction,

Double and Single District Stations,

And Individual Service Governors for Reducing High Pressure.

HOLDER GOVERNORS

And Low Pressure Regulators, all of the Dry Diaphragm type.

English Agents:
THE BRYAN DONKIN CO., LTD., Chesterfield, England.

Write for Catalog.

Combination Governor.
(Governor and Mercury Seal.)

Newbigging's Handbook for Gas Engineers and Managers.

Price, $6.50. For Sale by
A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

COAL TAR AND AMMONIA,

By GEORGE LUNGE, PH.D. Third and Enlarged Edition.
Price, $15. For Sale by
A. M. CALLENDER & CO., 42 Pine Street New York City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

THE PERKINS COMPANY,

228 and 229 Produce Exchange, New York City.

OCEAN MINE YOUGHIOGHENY GAS COAL,
OLD KENTUCKY SHALE AND O. K. BOGHEAD.

BERWIND-WHITE COAL MINING COMPANY'S

Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming. .

A. G. M. AZOY, General Agent, 1 Broadway, New York.

ISAAC C. BAXTER, President. ESTABLISHED 1864. PETER YOUNG, Secretary and Treasurer.

Works, LOCKPORT STATION, PA.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

Address all communications to JAMES GARDNER, JR., CO., Bolivar, Pa.

Fire Clay Goods for Gas Works.

Double Gate Valves.

A LARGE STOCK ON HAND READY FOR PROMPT SHIPMENT.

These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.....	8 inches	10 inches	12 inches	16 inches	20 inches	24 inches	30 inches	36 inches
Diameter of flanges....	13 inches	16 inches	18 inches	22½ inches	27 inches	31 inches	31½ inches	44 inches
Face to face of flange...	12 inches	12 inches	12 inches	14 inches	17 inches	20 inches	31 inches	23⅞ inches

For price and other information, apply to

THE CONTINENTAL IRON WORKS,
P. O. STATION G. NEW YORK (BOROUGH OF BROOK

Directory of American Gas Companies, 1909.

Price, $5.00.
For Sale by
A. M. Callender & Co., 42 Pine St., N. Y.

KELLER ADJUSTABLE COKE CRUSHER.

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,

Columbus, Ind.

Correspondence Solicited.

AWARDED A SILVER MEDAL AT THE WORLD'S FAIR, ST. LOUIS, 1904.

AGENTS.

Pacific Coast—VAN E. BRITTON, 269 Monadnock Building, San Francisco, Cal.

Great Britain—PARKER & LESTER, Old Kent Road, London.

MANUFACTURED BY

SAFETY GAS MAIN STOPPER CO.,

257-263 East 133d Street,

NEW YORK CITY.

PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C.

Send for Pamphlet on Patents.

EDMUND H. McCULLOUGH, President. H. C. ADAMS, 1st Vice-President. CHAS. F. GODSHALL, 2d Vice-Pres. & Treas. HENRY WHARTON, Secretary. C. B. NICHOLS, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J., WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

GAS MAINS—SERVICE PIPES.

Their installation for High or Low Pressure is the work in which we have specialized for years. Because of our Facilities and Experience, many Gas Companies prefer to contract with us for such work, rather than to execute it themselves. It proves to be as cheap in the end. We solicit inquiries.

Telephone Connection.

SULLIVAN BROS.,

11 Main St., Flushing, N. Y.

JOHN CABOT, President. GEO. D. CABOT, Secretary.

1412-1428 Adams Street, Hoboken, N. J.

PURIFIER AND SCRUBBER TRAYS.

Church's Patent Trays,

Reversible; Strongest; Most Easily Repaired.

We also Supply the Cheapest and Strongest

Reversible Bolted Trays.

Special Trays for Iron Oxide in Either Style.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,

DAYTON, O.

AMERICAN GAS ENGINEERING PRACTICE,

A HANDBOOK FOR ALL ENGAGED IN THE INDUSTRY,

Comprising Many Details Not Heretofore Published,

By M. NISBET LATTA, C.E.,

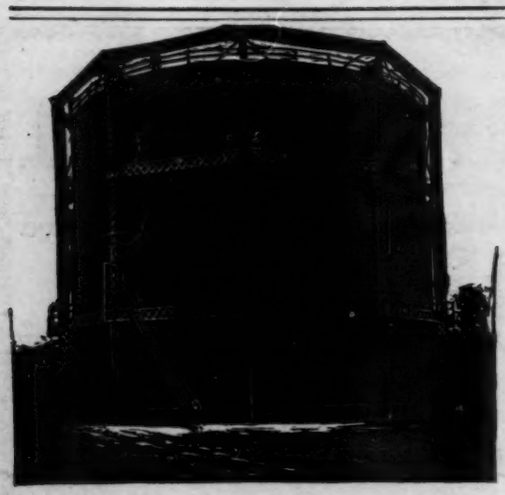
PART I. WATER GAS MANUFACTURE. The Generator. The Carburetter. The Superheater. Wash Box and Tar. Scrubbers. Condensers. Purifiers. Exhausters. Station Meters. Holders. Details of Works' Operation.

" II. GAS DISTRIBUTION. Naphthaline. Mains. Services. Consumers' Meters. Pressure. House Piping. Appliances.

" III. GENERAL TECHNICAL DATA. Properties of Gases. Steam. Mathematical Tables. Conversion Factors. Pipe and Miscellaneous Data.

Price, $4.50. For Sale by

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.



DAVIS & FARNUM MFG. CO.,

Principal Office and Works, Waltham, Mass.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

H. M. BYLLESBY & COMPANY

(INCORPORATED).

GAS ENGINEERS,

DESIGN, CONSTRUCT AND OPERATE
COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

EXAMINATIONS AND REPORTS.

AMERICAN TRUST BUILDING
CHICAGO.

Oklahoma City, Okla. Mobile, Ala. San Diego, Cal.

ALEX. C. HUMPHREYS, President.
WM. W. RANDOLPH, Vice-President.
EMILE GUILLAUDEU, Treasurer.
ROBT. O. LUQUEER, Secretary.
HOWARD E. WHITE, General Counsel.

EUROPEAN CORRESPONDENTS.
HUMPHREYS & GLASGOW,
LONDON. — BRUSSELS.

HUMPHREYS & GLASGOW, INC.,

CONSULTING ENGINEERS.

ADVICE AS TO EXTENSION, MANAGEMENT AND RECONSTRUCTION OF GAS AND ELECTRIC PLANTS.

COMPLETE EXAMINATIONS MADE. PROPERTIES PURCHASED.

CITY INVESTING BUILDING, 165 BROADWAY, NEW YORK.

"Industrial" Railway over Coal Storage, Ann Arbor Gas Company. This railway is also used to handle the cooled coke from the quenching chutes to the wooden storage bins.

"HUNT" LABOR-SAVING MACHINERY FOR GAS WORKS.

McDONALD-MANN QUENCHING CHUTES,

By which

The coke is quenched and dried in seven minutes.

Percentage of moisture does not exceed 6.6 per cent.

Breeze less than 4.5 per cent. after passing over the sizing screen.

Gas Engineers are particularly invited and requested to visit any of the Gas works equipped with our machinery easy of access from their vicinity.

Write for Bulletin A-1.

C. W. HUNT COMPANY,

WEST NEW BRIGHTON N. Y. NEW YORK OFFICE, 45 BROADWAY.

HENRY I. LEA,

GAS ENGINEER.

DESIGN, CONSTRUCTION AND MANAGEMENT OF GAS PLANTS.

EXAMINATIONS AND REPORTS.

THE ROOKERY, CHICAGO.

FIELD'S ANALYSIS FOR THE YEAR 1907.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland; being the 39th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine St., N. Y. City.

The Bartlett-Hayward Company,

Baltimore, Md. 100 Broadway, New York.

GASHOLDERS,

Coal and Water Gas Plants.

Western Representative: W. A. BAEHR, Commercial National Bank Building, Chicago, Ills.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS
AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, {FORT WAYNE, IND.

R. D. WOOD & CO.,

400 CHESTNUT ST., PHILADELPHIA,

MANUFACTURERS OF

Cast Iron Pipe.

HEAVY LOAM CASTINGS,

Dunham Specials,

Hydraulic Work,

LAMP POSTS, VALVES, ETC.,

Gas Power Plants with Producers.

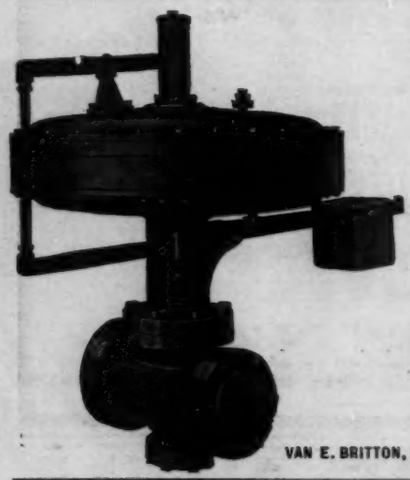
BUILDERS OF

Gasholders.

Single or Multiple Lifts, with or without Metal Tanks.

PURIFIERS, CONDENSERS, SCRUBBERS, BENCH WORK.

Cutler's Patent Freezing Preventer for Holder Cups.



THE FULTON GAS PRESSURE GOVERNORS

For Artificial or Natural Gas.
For District or Individual Service.

Our Improved **Duplex Sensitive Governor** for district service will reduce high pressure gas to inches of water without variation. Absolutely safe and reliable. No complicated mechanism to get out of order. No auxiliary regulators or other devices to assist the main governor required. The most simple and perfect governor ever placed on the market. We also manufacture Holder Governors, Compressor Governors and Individual Service Governors for any inlet and outlet pressure.

More than 20 years' experience with the largest gas companies. Send for Catalog.

THE CHAPLIN-FULTON MFG. CO.

VAN E. BRITTON, Pacific Coast Agent, Monadnock Bldg., San Francisco, Cal. 28-34 PENN AVE., PITTSBURGH, PA.

COAL TAR AND AMMONIA.

THIRD AND ENLARGED EDITION.

BY

GEORGE LUNGE, PH.D.

Price, $15. For Sale by

A. M. CALLENDER & CO., - - 42 Pine Street, New York City.

THE GAS ENGINEER'S POCKET-BOOK,

By HENRY O'CONNOR,

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas and the Construction of Gas Works.

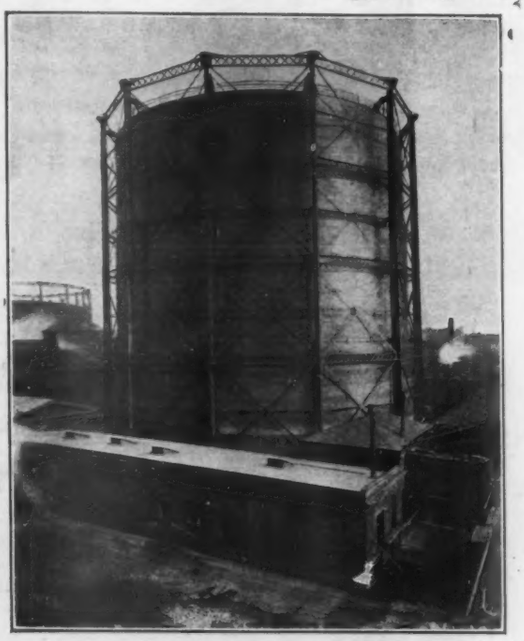
PRICE, $3.50.

FOR SALE BY

A. M. CALLENDER & CO., - No. 42 Pine Street, New York City.

THE STACEY MANUFACTURING COMPANY,

GAS ENGINEERS, DESIGNERS AND BUILDERS.



GAS HOLDERS

Roofs and Structural Steel Work.
Condensers—Washers—Extractors—Purifiers.
Bench Iron—Valves—Cast Iron Fittings and Specials.
Oil, Water and Storage Tanks of Every Description.
Stacks—Stand Pipes—Etc.

"CHOLLAR'S" PATENTED SYSTEM OF GAS PURIFICATION.

GENERAL OFFICES AND WORKS:
(ELMWOOD PLACE STATION)
CINCINNATI.

WESTERN OFFICE:
718 Mission Street, - - - San Francisco, Cal.

THESE BOOKS ARE NEW.

LIQUID AND GASEOUS FUELS,
By Vivian B. Lewes.
334 pages. . . . . Price, $2.

THE GAS ENGINE,
By Forrest R. Jones. 447 pages and 142 cuts. Price, $4.

HEATING,
By W. J. Baldwin.
Price, ... $2.50.

HEAT, ENERGY AND FUELS,
By Oskar Nagel. 306 pages and 118 illustrations. Price, $3.

PRODUCER GAS AND GAS PRODUCERS,
By Samuel S. Wyer. 295 pages. Price, $4.

LAW AND BUSINESS OF ENGINEERING AND CONTRACTING,
By Charles E. Fowler. Price, $2.50.

GAS PIPING AND GAS LIGHTING,
By W. P. Gerhard.
310 pages. . . . . Price, $3.

GAS POWER,
By F. E. Junge, M.A., C.E., M.E.
548 pages. . . . . Price, $5.

GAS, GASOLINE AND OIL ENGINES,
Including Producer Gas Plants.
By Gardner D. Hiscox, M.E. Price, $2.50.

STANDARD WORKS.

GAS MANUFACTURE,
By W. J. A. Butterfield.
Price, ... $2.50.

HANDBOOK ON GAS ENGINES,
By G. E. Lieckfeld, C.E. Translated by George M. Richmond, M.E. Price, $1.

GAS AND GAS WORKS,
By Hughes and O'Connor.
Price, ... $2.50.

CHEMISTRY OF GAS MANUFACTURE,
By Harold M. Royle, F.C.S.
Price, ... $4.50.

GAS MANUFACTURE FOR STUDENTS,
By John Hornby.
Price, ... $1.50.

COAL TAR AND AMMONIA,
By George Lunge.
Price, ... $15.

GAS ANALYST'S MANUAL,
By Jacques Abady.
Price, ... $6.50.

SELF-INSTRUCTION FOR STUDENTS,
Elementary, Advanced, Constructional.
Price, ... Each, $1.50.

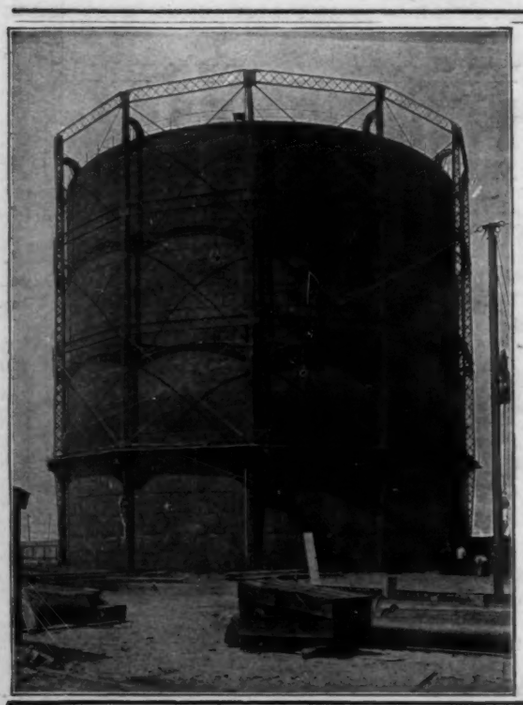
THE CALORIFIC POWER OF FUELS,
By Herman Poole.
Price, ... $3.00

MODERN RETORT SETTINGS,
By G. P. Lewis.
Price, ... $1.50.

ART OF ILLUMINATION,
By Dr. Louis Bell.
Price, ... $2.50.

GAS COMPANIES' BOOKKEEPING,
By Brearley and Taylor.
Price, ... $4.50.

We will be Glad to Furnish Any Engineering Book.
SEND CHECK, DRAFT, POST OFFICE or EXPRESS MONEY ORDER.
AMERICAN GAS LIGHT JOURNAL - - - 42 PINE STREET, NEW ORK CITY.



JOHN FOWLER, President. J. SCOTT FOWLER, Vice-Pres. & Treas.

DEILY & FOWLER MFG. CO.,

39 Laurel Street, Philadelphia, Pa.

ESTABLISHED 1842. INCORPORATED, 1908.

BUILDERS OF

GASHOLDERS,

Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.

CONNERSVILLE GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS.

THIS cut shows one of our High Pressure machines and a 4-valve engine connected by one of our leather link flexible couplings. Two of these units were installed for the Peoples Gas Light and Coke Co., Chicago, at their 73d St. Station. Each machine has a capacity of 14,000,000 cubic feet per day.

—o—

We also manufacture

GAS VALVES,
BY-PASS VALVES,
PRESSURE REGULATORS,
ETC., ETC.

Correspondence Solicited.

THE CONNERSVILLE BLOWER COMPANY,

Connersville, Indiana, U. S. A.

NEW YORK OFFICE, 50 Church Street. - CHICAGO OFFICE, 536 Monadnock Bldg.

1909 DIRECTORY 1909

OF AMERICAN GAS COMPANIES.

Price, - - - - - - - - - $5.00.

AMERICAN GAS LIGHT JOURNAL, - 42 Pine St., New York City.

D. McDONALD & CO.,

971-997 BROADWAY, ALBANY, N. Y.,

MANUFACTURERS OF

DRY GAS METERS, STATION METERS, PREPAYMENT METERS, METER PROVERS AND GAUGES.

THE GLOVER PREPAYMENT METER,

Simple, Strong, Satisfactory.

THE HINMAN STATION METER DRUM,

The greatest advance that has been made in 20 years in the ACCURATE and ECONOMICAL measurement of gas in large quantities. :: :: ::

NEW YORK OFFICE: 561 West 47th Street. | ALBANY OFFICE: 991 Broadway. | CHICAGO OFFICE: Jefferson and Monroe Streets.

The Sprague Meter Co.

Manufacturers of

Cast Iron Gas Meters

for

Artificial or Natural Gas

Plain or Prepayment

Lower in first cost and cheaper to maintain than any meter on the market.

Write us for particulars.

The Sprague Meter Company

203 Water St., Bridgeport, Conn.

ALCOHOL, Its Manufacture from Farm Products and De-Naturing,

By F. B. WRIGHT.

A NEW AMERICAN BOOK.

CONTENTS.

Chapter 1. Alcohol, its various forms and sources.
" 2. Mashing, cooling and fermentation in general.
" 3. Distillation, simple forms of stills, the production of Alcohol from wine.
" 4. Malting.
" 5. Alcohol from Potatoes, mashing, fermentation, distillations, Continuous stills.
Chapter 6. Alcohol from Grain.
" 7. Alcohol from Beets.
" 8. Alcohol from Sorghum and Molasses.
" 9. De-natured Alcohol and its Commercial uses.
" 10. Alcoholometry. Index.

Fully Illustrated with Original Drawings of Necessary Apparatus.

PRICE, $1. For Sale by

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

NATHANIEL TUFTS METER COMPANY,

455 Commercial St., Boston, Mass.

PREPAYMENT GAS METERS,
WET AND DRY GAS METERS, STATION METERS, ETC.

REPAIRING OF ALL MAKES OF METERS, AND FITTED WITH OUR PREPAYMENT ATTACHMENT.

B

METERS.

INCREASED CAPACITY.
INCREASED EFFICIENCY.

PREPAYMENT METERS, STATION METERS, METER PROVERS, ETC.

PROMPT AND CAREFUL ATTENTION TO ALL REPAIR WORK.

MARYLAND METER COMPANY,

BALTIMORE.—CHICAGO.

YOU NEED ONE OR MORE OF OUR COMPLAINT METERS.

METERS, Plain and Prepayment,

For Artificial or Natural Gas.

Repairing All Makes and Attachments Added if Desired.

SPECIAL METERS FOR ACETYLENE.

KEYSTONE METER COMPANY,

ROYERSFORD, PA.

JUDICIOUS ECONOMY IS EFFECTED

BY USING

5-L. IMPROVED GAS METERS.

LOW SPEED, LARGE DIAPHRAGMS,
STRONGER CONSTRUCTION,
LARGER CAPACITY.

FITTED WITH

THE NEW YORK PREPAYMENT ATTACHMENT.
STEEL BOX AND CABINET LOCK.

NEW YORK IMPROVED METER CO., 306-310 East 47th St., New York City.

PACIFIC COAST REPRESENTATIVE: THE NORTHWEST GAS EQUIPMENT CO., Portland, Ore.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers,
Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

INLET AT TOP.

PATENTED MAY 13, 1902.

STANDARD AND SELF-DRAINING GAS METERS.

PLAIN OR PREPAYMENT FOR ARTIFICIAL OR NATURAL GAS.

LARGE CAPACITY.
LOW SPEED.
STRONG CONSTRUCTION.

REPAIRING OF ALL MAKES OF METERS.

UNITED STATES METER COMPANY,

229 to 269 Chestnut Street, Brooklyn, N. Y.

INLET AT BOTTOM.

PATENTED MAY 13, 1902.

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,
PHILADELPHIA.

559 West 47th Street,
NEW YORK.

Jefferson and Monroe Streets,
CHICAGO.

GAS METERS,

Station Meters and Apparatus of Every Description.

REPAIRING CAREFULLY DONE.

THE POSITIVE PREPAYMENT METER.

OVER 600,000 OF THESE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES, AND THE DEMAND IS STEADILY INCREASING.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

SEND FOR OUR CATALOGUE AND OUR PREPAYMENT BOOKLET.

LE N '09